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16. ABSTRACT This report presents the results of a three part study involving (1) the enhancement of EPA's VEHSIM vehicle simulation computer program for studying vehicle emission effects, (2) the application of this program to the determination of vehicle fuel economy and emission responses to variation in driving cycles, vehicle weight, acceleration rates, and emission control constraints, and (3) the reduction of EPA-furnished raw data on transient and temperature effects on emissions.

The VEHSIM vehicle simulation computer program was modified to perform simultaneous computations of fuel economy and emission factors for HC, CO and NOx. The weight sensitivity analysis showed that the effect of increasing weight in three different vehicles decreased fuel economy, produced mixed results for HC emissions, and generally increased CO and NOx emissions. Increasing driving cycle acceleration/deceleration rates was found generally to decrease fuel economy and to increase emission rates. Driving cycle simulation using two sets of emission control logic developed by DOT to optimize EPA 55/45 fuel economy were found to improve fuel economy, but to increase HC and NOx under higher speed driving conditions compared to the LA-4 which was the emissions basis for the control logic development.

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EMISSION MODELING AND SENSITIVITY STUDY

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FOREWORD

This report, prepared by The Aerospace Corporation for the U.S. Environmental Protection Agency (EPA), Emission Control Technology Division, presents the results of a three-part study involving (1) the enhancement of EPA's VEHSIM vehicle simulation computer program for studying vehicle emission effects, (2) the application of this program to the determination of vehicle fuel economy and emission responses to variation in driving cycles, vehicle weight, acceleration rates, and emission control constraints, and (3) the reduction of EPA-furnished raw data on transient and temperature effects on emissions.

The report is organized as follows. A synopsis of the study results is presented in the "Summary" section. Section 2 describes the various VEHSIM enhancements implemented and their operational characteristics. Section 3 presents the numerical results of the fuel consumption and emission sensitivity simulations. Section 4 contains a description of the transient emissions data processed.

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SUMMARY

The VEHSIM vehicle simulation computer program was modified to perform simultaneous computations of fuel economy and emission factors for HC, CO, and NO_x. This was accomplished by writing a new program element, VSIME, which utilizes (1) the VEHSIM program output for engine speed- and torque-time histories and (2) engine emission map inputs, to calculate instantaneous and cumulative emission rates over the driving cycle. The program output includes emission quantities computed by VSIME and fuel consumption quantities computed by VEHSIM. A complete description of the structure, input and output formats, and operation of this modified simulation program is provided.

The VEHSIM and VSIME programs were utilized to investigate the sensitivity of emissions and fuel consumption factors to changes in vehicle weight, acceleration/deceleration, and emission control logic. The weight sensitivity analysis considered three different vehicles, a Honda 90, a Buick 231, and a Chevrolet 350, operating over eight driving cycles or conditions, and examined the effect of increasing the vehicle weights by 300 and 600 pounds. Fuel economy was found to decrease with increasing weight for all vehicles over all cycles. The HC results were mixed, with the Honda generally showing definite increases in HC with weight, the Buick showing little or no increase with weight, and the Chevrolet showing no consistent change with weight except for the lowest speed NYC driving cycle where HC emissions increased with weight. CO emissions were found to generally increase with weight, with a maximum effect indicated for the lower speed driving cycles. NO_x emissions also generally increased with weight, but the Honda vehicle showed a reversal in this trend at high speed cruise operation.

Three driving cycles; NYC, HWY, and LA-4; were modified to change their overall acceleration/deceleration rates by factors ranging from 1.5 to 3.5. The general effect of increasing cycle accel/decel rates was to decrease fuel economy and to increase emission rates for all pollutants. The Honda and Buick vehicles were found to depart in certain instances from this general trend. In the NYC

driving cycle, fuel economy increased and HC emissions decreased for the Honda and NO_x decreased for the Buick at the most extreme cycle perturbation conditions. These effects were found to be consistent with the characteristics indicated by the engine maps utilized in this study.

Two sets of emission control logic developed by DOT to optimize EPA 55/45 fuel economy were tested over four driving cycles; LA-4, HWY, NYC, and 70SS. While fuel economy relative to the base case was found to improve at these modified control conditions, HC and NO_x levels increased under the higher-speed cycles compared to the LA-4, which was the emissions basis for the control logic development.

Transient engine and temperature raw data from EPA-supplied charts were extracted, tabulated and stored for future retrieval and use. The computerized data were supplied to EPA on hard copy as well as magnetic tape. A set of catalyst conversion efficiency maps was developed using EPA-supplied engine-out and catalyst-out data for three vehicles.

SECTION 1

INTRODUCTION

The objectives of this study were threefold: (1) to increase the flexibility and utility of the Environmental Protection Agency's (EPA) VEHSIM vehicle simulation computer program by modifying it, as necessary, to accept additional driving cycles, vehicle load increments, and vehicle emission maps, (2) to use this modified program to determine vehicle fuel economy and emission responses to changes in driving cycle, vehicle weight, acceleration rates, and emission control constraints, and (3) to reduce raw emission test data supplied by EPA. These objectives were met by first defining and compiling the characteristics and details of the required program inputs. Input data and other information supplied by EPA included driving cycle characteristics, emissions and fuel consumption maps, data on transient emissions, and control logic scenarios. These data were converted to a form compatible with machine processing. Secondly, methodologies were established and corresponding simulation program modifications were implemented to accept and process the program inputs. Finally, emission and fuel consumption results were computed and analyzed.

SECTION 2

DESCRIPTION OF VSIME PROGRAM

2.1 INTRODUCTION

In a previous EPA-sponsored Aerospace study involving the analysis of timing and carburation calibration effects on fuel economy (Ref. 1), the DOT VEHSIM computer program was selected from among several candidate vehicle simulation computer routines as being the best for general EPA use in conducting analyses of automobile fuel economy and emission effects. In the course of that study, a number of VEHSIM program modifications were made to implement the analysis of timing and carburation calibrations and to improve the utility of the program for the analysis of driving cycle effects on emissions. This section describes a computer program, VSIME, which was designed and implemented to further enhance VEHSIM program capabilities in the area of emission effects analysis, with the immediate goal of conducting a prescribed investigation of vehicle operating characteristics under driving or calibration conditions not presently included in the official EPA emission test procedure.

In summary, VSIME is a modified version of VSIMI (Ref. 1). VSIME accepts vehicle emission maps for HC, CO and NO_x as inputs and simultaneously computes vehicle emissions for each pollutant specie for a prescribed driving cycle and vehicle definition. VSIME operates in a "piggyback" fashion with VEHSIM, thereby taking full advantage of the "case stacking" abilities of VEHSIM.

2.2 COMPUTATIONAL APPROACH

The primary computer programming task was directed to the simultaneous computation of fuel economy and emission factors for HC, CO, and NO_x. The general approach taken was as follows:

(a) for a specific vehicle configuration and driving cycle, the VEHSIM computer program is utilized to produce a dynamic vehicle simulation, to compute instantaneous fuel consumption, and to output time histories of speed, torque and fuel consumption.

(b) A new program, VSIME, developed in the present study, adds instantaneous emissions for HC, CO, and NO_x to the VEHSIM output.

This two-step approach was motivated by the desire to utilize the EPA version of the VEHSIM program without additional modifications and to exploit repeatedly the VEHSIM simulation outputs (engine, rpm, BMEP, fuel consumption, etc.) without the necessity of multiple VEHSIM runs. The VEHSIM version utilized was that described in Reference 1, and no modifications were made during this study.

A schematic of the computational procedure and the relationship of the various elements of the approach are shown in Figure 2-1. Sections 2.3 through 2.7 discuss in detail the VSIME program while Section 2.8 discusses the operational aspects of the overall procedure.

2.3 INPUTS

Inputs to VSIME consist of the output tape (tape 19) from VEHSIM and three engine emission maps, one each for HC, CO, and NO_x, which are input by punched cards. Each engine emission map gives the emission rate as a function of engine rotational speed and engine torque (lb-ft). The HC and NO_x emission rates are input in units of grams per hour. The CO emission rate is entered in units of 10 grams per hour; thus a CO emission rate input as 1.1 would be interpreted by the program as 11 grams per hour. Engine rotational speed is specified in rpm with no option provided to input engine speed in the form of piston speed. Additional punched card inputs identify the input unit options; e.g., rpm, engine displacement (cubic inches), and stroke (inches); and selective printout options.

The results from VEHSIM are input to VSIME as a magnetic tape or permanent disc file, giving at each segment of the driving cycle:

a. cumulative time (seconds)
b. cumulative distance (miles)
c. cumulative fuel consumption (pounds)
d. engine horsepower (hp)
e. engine load (lb-ft)

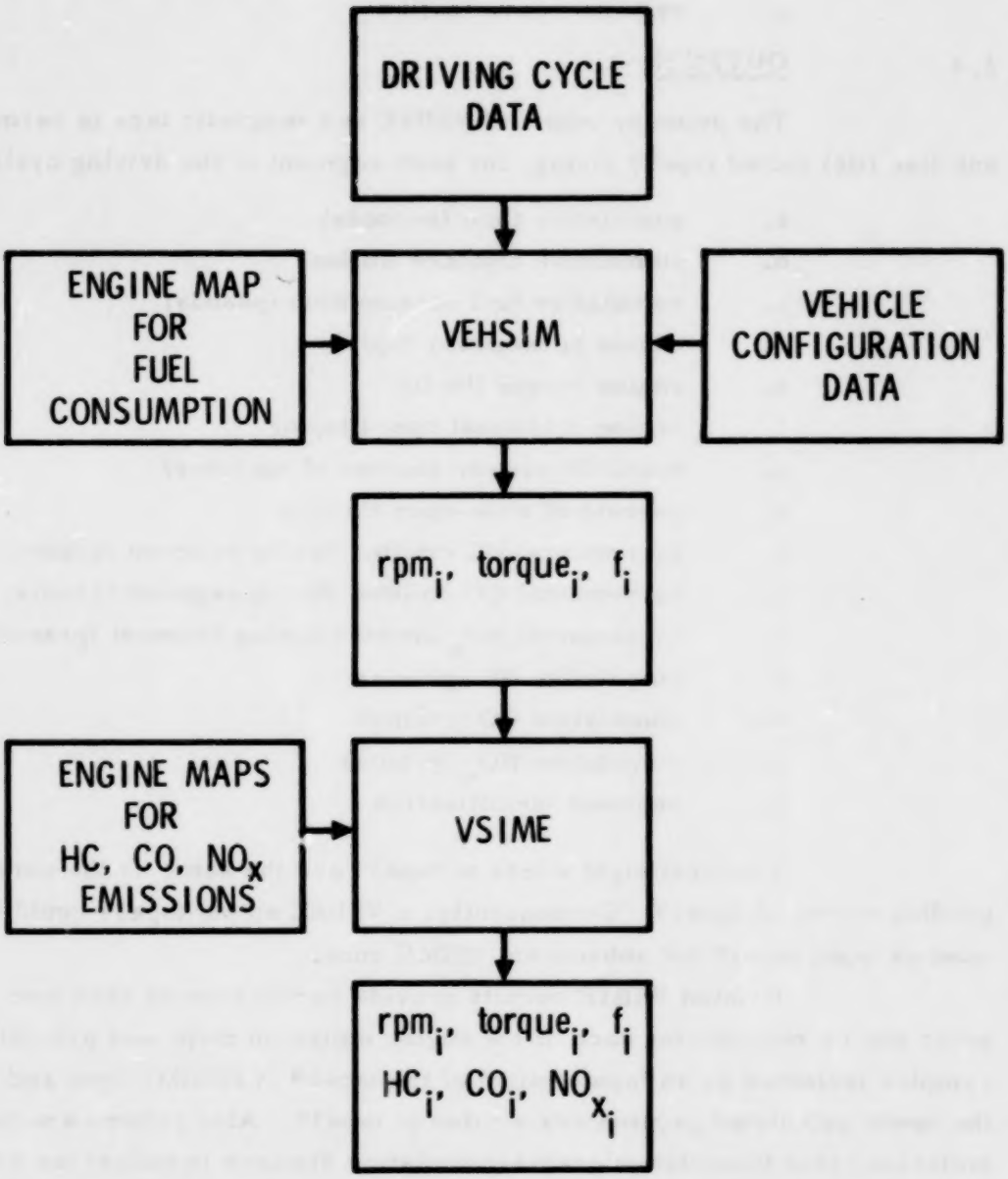

Figure 2-1. Computational Procedures and Relationships

f. engine rotational speed (rpm)

g. manifold vacuum (inches of mercury)

h. percent of wide open throttle

i. segment identification

2.4 OUTPUTS

The primary output of VSIME is a magnetic tape (a permanent disc file) called tape39 giving, for each segment of the driving cycle:

a. cumulative time (seconds)

b. cumulative distance (miles)

c. cumulative fuel consumption (pounds)

d. engine horsepower (hp)

e. engine torque (lb-ft)

f. engine rotational speed (rpm)

g. manifold vacuum (inches of mercury)

h. percent of wide-open throttle

i. incremental HC emitted during segment (grams)

j. incremental CO emitted during segment (grams)

k. incremental NO_x emitted during segment (grams)

l. cumulative HC (grams)

m. cumulative CO (grams)

n. cumulative NO_x (grams)

o. segment identification

The first eight words of tape39 are the same as the corresponding words on tape19. Consequently, a VSIME output tape39 could be used as input tape19 for subsequent VSIME runs.

Printed VSIME outputs provide verification of each computer run by reproducing each of the engine emission maps and providing samples (selected by an input option) of the tape19 (VEHSIM) input and of the newly calculated parameters written to tape39. Also printed are the emission rates (cumulative grams/cumulative distance in miles) for each segment sampled. The final segment is always printed regardless of the printout option selected.

2.5 PROGRAM STRUCTURE

The major stages of the VSIME program consist of: (1) the input of engine emission map data and the input of driving cycle data from tape19, (2) the computation of each emission for each segment of the driving cycle, and (3) the writing of resulting values onto tape39.

2.5.1 Data Input

Engine maps are read from punched cards in subroutine CARDCD, and many checks are performed. Program operation is aborted if any check fails, as follows.

a. There must not be a premature end of file.

b. Cards must be in the proper order, as indicated by card headings.

c. Values for designating input options must be meaningful.

d. Speed values must increase steadily.

e. Engine displacement must be positive.

f. Load data must increase steadily.

The engine maps are set up in core within CARDCD, with a count of the number of points on each load card so that the tables can have any length from 2 to 10.

In subroutine CYCLE, the data from tape19 are read and stored in core.

2.5.2 Engine Map Scaling

No scaling provision is incorporated.

2.5.3 Computations

The following computations are performed for each segment of the driving cycle. The time duration of the segment is determined. The load and the rpm values are read. Then each value of emission rate is found by double interpolation with respect to load and rpm within each engine map. The first two interpolations are with respect to load, for the two constant rpm lines that bracket the rpm value, and the final interpolation is with respect to rpm. In any interpolation, if the

independent variable lies beyond the range of tabulated values, the near end-point value is utilized. The interpolation function is performed by the subroutine IMAP.

The emission in grams per segment is calculated by converting the rate from grams per hour to grams per second and multiplying the interpolated emission by the segment duration.

2.6 DATA INPUT FORMATS

Engine-map data are input from punched cards in the formats depicted in Figure 2-2. Except for the second identification card and the third engine data-card, all input cards begin with a designation phrase which must be included, since that phrase is used to check whether the input cards are in the proper order. All numerical data must include a decimal point.

The first card acts to initialize the run sequence. The input rpm must be present in column 31-33 which is currently the only units allowed for engine speed for the emission maps. Columns 55-59 are used to select the desired output format. If LONG is punched, the results of the computations are printed for every segment of the driving cycle. Otherwise, the results are printed for the first 100 segments and the last 2 segments of the driving cycle.

The second card must be present; its contents are printed to identify the vehicle being run. The third card contains engine displacement (cubic inches) in columns 13-18 and engine stroke (inches) in column 25-30.

The remaining emissions cards consist of 2 to 10 sets of three cards:

a. The SPEED card contains the rpm value in column 13-18.

b. The LOAD card contains 2 to 10 values of engine load (lb-ft).

c. The EMISS DATA card contains emission rates corresponding to the engine load values.

Each map is preceded by a DATA card which identifies the specific emission constituent. The order in which the maps are input is immaterial.

FORTRAN CODING FORM

PROBLEM NO. _____ PROGRAMMER _____ KEYPUNCHED _____ VERIFIED _____ DATE _____ PAGE ___ OF ___

STATEMENT NO.	FORTRAN STATEMENT
1	6 7 12 19 25 31 37 43 49 55 61 67 72 73 80
*EMISS	Engine RPM SHORT or LONG
	Identification Card, up to 80 Digits
	Displacement Stroke
DATA	CO
SPEED	POINT
LOAD	POINT
EMISS	DATA
	Additional sets of speed, load, and CO emissions
DATA	HC
	HC speed, load, and emission sets
DATA	NOX
	NO_x speed, load, and emission sets

Figure 2-2. Input Data Card Format for VSIME

2.7 IMPLEMENTATION

VSIME is written in FORTRAN IV. It has been run on the CDC 7600 computer under the SCOPE 2.1 operating system. Three system-provided functions are utilized:

a. The EOF(N) function, which tests for an end-of-file condition.

b. The DATE(X) function, which returns the date in the form of a 10-letter alphanumeric word.

c. The TIME(X) function, which returns the time of day in the form of a 10-letter alphanumeric word.

Except for the date and time, which are written by subroutine CARDCD, all alphanumeric words contain 5 or fewer characters. Names of variables, subroutines, and common blocks contain 6 or fewer characters.

2.8 PROGRAM OPERATION

2.8.1 Introduction

This section presents examples of computer deck setups. Computer control statements are given in the SCOPE 2 control language for the CDC 7600. However, the "CATALOG" statement, which preserves a permanent file, has been simplified by omission of the ID = name (creator identification) parameter. In the examples it is assumed that data and output files, denoted by TAPExy, are permanent disc files. Control statement modifications would be required if physical magnetic tapes were to be used.

2.8.2 VEHSIM

In operation, Program VEHSIM requires an input file (TAPE6), two temporary files (TAPE2 and TAPE5), a data output file (TAPE19), and parts file (TAPE3). Generation of a parts file, and its modification, is one of the capabilities of VEHSIM. Reference 2 describes all of the capabilities and input options for VEHSIM.

Figure 2-3 is an example of the control and input cards required to perform a single simulation run using VEHSIM. The parts file (TAPE3) and output data file (TAPE19) are assumed to be permanent disc files. The VEHSIM input cards are instructions for the program to construct a vehicle from options contained in the parts file, define a driving schedule and route, and perform the simulation.

Program VEHSIM utilizes the feature, available in the SCOPE 2.1 operating system for the CDC 7600 computer, of having all program variables preset to 0. If those variables are preset to indefinite, the default value in SCOPE 2.1, program execution is aborted. It is not known what results would be obtained on other computers or with other preset values.

2.8.3 VSIME

In operation, Program VSIME requires an input file (called TAPE5), a printer output file (TAPE6), a file (TAPE19) which contains the results of a VEHSIM run, and a file (TAPE39) which contains the detailed VSIME results. With SCOPE 2 operating system, the input file (TAPE5) for VSIME must not be identical to the system INPUT file because the BACKSPACE command is utilized. Consequently, the INPUT file is copied to TAPE5, which is then rewound. Provision of an independent input file has the advantage that successive VSIME runs using the same vehicle may be made in the same job submittal with only one input file.

Figure 2-4 is an example of the control and inputs required to perform a single VSIME run. The VEHSIM result file (TAPE19) and output result file (TAPE39) are again assumed to be permanent disc files. The VSIME input cards define the selected input data format options, name the reference vehicle and define two of its parameters, and specify the emission engine maps. In Figure 2-4. the engine displacement is 349.8 cubic inches, and the stroke is 3.48 inches.

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```
          ****      SCOPE 2.1 CONTROL CARDS      ****

REQUEST(TAPE19,*PF)                 RESERVE PERMANENT FILE LOCATION
ATTACH(TAPE3,VEHSIMPRTSFL)          TAPE 3 CONTAINS VEHSIM PARTS FILE
ATTACH(VEHSIM,6VEHSIM)              PERMANENT FILE WITH VEHSIM OBJECT CODE
LDSET(PRESET=ZERO)                  INITIALLY SET ALL CORE TO ZERO
VEHSIM.                             LOAD AND EXECUTE PROGRAM VEHSIM
CATALOG(TAPE19,CHEV350FUEL)         PRESERVE TAPE 19 AS PERMANENT FILE

7/8/9 MULTIPLE PUNCH IN COLUMN 1  END OF RECORD CARD

          ****          VEHSIM INPUT CARDS          ****

*USE  T252Y2      GEAR                    1
*USE  T152Y2      GEAR                    2
*USE  T100Y2      GEAR                    3
*USE  TEST2       SHIFT LOGIC
*PRINT UNITS      ENGINE      RPM          TORQUE      LB/HR
*LIMIT PRINT      SEGMENT
*USE  LFAY2A      ACCESSORY
*USE  CODY2       CONVERTER
*USE  CCCY2       CONVERTER
*USE  LEVEL       ROUTE
*USE  UDC001      DRIVING SCHEDULE
*TITLE      FUEL RUN CHEV 350 WT 5000  8 DRIVING CYCLES  1ST=URBAN
*USE  350V-8      ENGINE          1      1 2 3
*USE  C5000A      VEHICLE
*SIMULATE

6/7/8/9 MULTIPLE PUNCH IN COL. 1  END OF FILE CARD
```

Figure 2-3. Deck Setup for Program VEHSIM

```
          ****      SCOPE 2.1 CONTROL CARDS      ****

REQUEST(TAPE39,*PF)                 RESERVE PERMANENT FILE LOCATION
ATTACH(TAPE19,CHEV350FUEL)          PERMANENT FILE WITH VEHSIM OUTPUT
ATTACH(VSIME,6VSIMEBRK)             PERMANENT FILE WITH VSIME OBJECT CODE
VSIME.                              LOAD AND EXECUTE PROGRAM VSIME
CATALOG(TAPE39,CHEV350VSIME)        PRESERVE TAPE 39 AS PERMANENT FILE

7/8/9 MULTIPLE PUNCH IN COLUMN 1  END OF RECORD CARD

          ****          VSIME INPUT CARDS          ****

*EMISS            CHEV        RFM
 CHEV 350V-8 CATALYTIC CONVERTER CID=349.8 STROKE=3.48
           349.8       3.48
DATA       NOX
SPEED POINT  650.0                                                    003190
LOAD POINT  0.0001  30.6  30.9  31.3  31.7  32.0  32.4  32.7  33.1  33.4000140
EMISS DATA     3.7   3.7   3.6   3.6   3.5   3.5   3.4   3.4   3.4   3.3003210
LOAD POINT    33.8  34.1  34.5  34.8  35.2  35.5  35.9  36.2  36.6  36.9003240
EMISS DATA     3.3   3.2   3.2   3.1   3.1   3.0   3.0   2.9   2.9   2.8003250
SPEED POINT  800.0                                                    003280
LOAD POINT   -3.80.0001   0.2   0.3   0.5   0.7   0.9   1.0   1.2   1.4000230
EMISS DATA     3.7   2.2   2.2   2.2   2.3   2.3   2.3   2.3   2.3   2.4003300
LOAD POINT     1.5   1.7   1.9   2.0   2.2   2.4   2.6   2.7   2.9   3.1003330
EMISS DATA     2.4   2.4   2.4   2.5   2.5   2.5   2.5   2.5   2.6   2.6003340
SPEED POINT 1000.0                                                    003370
LOAD POINT   -8.80.0001  13.2  26.4  39.6  52.9  66.1  79.3  92.5 105.7000320
EMISS DATA     3.7   4.2   3.6   7.9  14.2  16.3  14.5  13.3  15.5  24.4003390
LOAD POINT   118.9 132.1 145.4 158.6 171.8 185.0 198.2 211.4 224.6 237.9003420
EMISS DATA    46.5  88.5 136.6 150.8 122.2  67.7  74.6  94.4 155.6 130.2003430
SPEED POINT 1300.0                                                    003460
LOAD POINT   -16.30.0001  14.2  28.4  42.7  56.9  71.1  85.3  99.5 113.8000410
EMISS DATA     3.7   4.7   6.7  11.5  17.3  21.3  23.1  24.4  27.6  34.9003480
LOAD POINT   128.0 142.2 156.4 170.6 184.9 199.1 213.3 227.5 241.8 256.0003510
EMISS DATA    49.0  72.1 101.8 126.7 130.8 112.0  85.2  67.6  70.4 127.3003520
SPEED POINT 1500.0                                                    003550
LOAD POINT   -21.30.0001  14.8  29.6  44.4  59.2  74.0  88.8 103.6 118.4000500
EMISS DATA     3.7   4.5   7.8  15.2  24.6  32.0  37.1  43.0  54.1  75.5003570
LOAD POINT   133.2 148.0 162.8 177.6 192.4 207.2 222.0 236.8 251.6 266.5003600
EMISS DATA   111.8 160.9 204.2 211.6 174.7 120.6  78.6  57.2  53.9  68.5003610
SPEED POINT 1900.0                                                    003640
LOAD POINT   -31.3   3.1  17.7  32.4  47.1  61.7  76.4  91.0 105.7 120.3003650
EMISS DATA     3.7  13.8  11.1  14.0  22.7  40.0  67.9 104.3 144.2 185.3003660
LOAD POINT   135.0 149.7 164.3 179.0 193.6 208.3 223.0 237.6 252.3 266.9003690
EMISS DATA   230.3 284.4 344.9 388.6 371.0 273.3 150.3  70.2  42.9  86.7003700
SPEED POINT 2200.0                                                    003730
```

Figure 2-4. Deck Setup for Program VSIME

```
LOAD POINT   -38.8   3.1  17.5  31.9  46.3  60.7  75.1  89.4 103.8 118.2003740
EMISS DATA     3.7  20.6  17.4  25.8  45.1  75.9 115.3 159.8 211.2 277.3003750
LOAD POINT   132.6 147.0 161.4 175.8 190.2 204.6 219.0 233.3 247.7 262.1003780
EMISS DATA   366.5 476.8 497.9 497.9 480.2 293.8 142.1  66.3  45.5  96.5003790
SPEED POINT 2400.0                                                    003820
LOAD POINT   -43.8   3.1  17.7  32.3  46.9  61.5  76.1  90.7 105.4 120.0003830
EMISS DATA     3.7  18.1  54.6  46.7  43.5  63.4 127.3 268.6 476.4 633.2003840
LOAD POINT   134.6 149.2 163.8 178.4 193.0 207.6 222.3 236.9 251.5 266.1003870
EMISS DATA   633.2 633.2 603.1 553.4 463.6 298.8 130.5  45.7  30.6 342.2003880
SPEED POINT 2800.0                                                    003910
LOAD POINT   -53.9   3.1  17.7  32.4  47.1  61.8  76.5  91.2 105.9 120.6003920
EMISS DATA     3.7  20.7  51.7  63.7  73.8 101.5 161.2 262.7 396.8 530.7003930
LOAD POINT   135.3 150.0 164.6 179.3 194.0 208.7 223.4 238.1 252.8 267.5003960
EMISS DATA   635.7 709.7 754.6 754.6 697.3 502.2 273.6 129.2  92.5 374.2003970
SPEED POINT 3300.0                                                    004000
LOAD POINT   -66.4   3.1  15.4  27.8  40.2  52.6  65.0  77.4  89.8 102.1004010
EMISS DATA     3.7  36.9  56.3  71.6  98.1 149.0 233.8 348.6 467.6 560.3004020
LOAD POINT   114.5 126.9 139.3 151.7 164.1 176.5 188.8 201.2 213.6 226.0004050
EMISS DATA   618.9 663.9 724.0 815.3 922.0 926.2 904.6 712.3 550.2 659.4004060
SPEED POINT 3800.0                                                    004090
LOAD POINT   -78.90.0001  10.8  21.6  32.4  43.2  54.1  64.9  75.7  86.5001040
EMISS DATA     3.7  24.8  16.3  36.3  96.4 196.9 288.9 338.5 368.4 419.9004110
LOAD POINT    97.3 103.1 118.9 129.7 140.5 151.4 162.2 173.0 183.8 194.6004140
EMISS DATA   528.4 721.1 995.21269.81281.01259.4 968.3 672.4 445.9 269.6004150
DATA         CO
SPEED POINT  650.0                                                    001150
LOAD POINT 0.0001  30.6  30.9  31.3  31.7  32.0  32.4  32.7  33.1  33.4000140
EMISS DATA     0.2   0.2   1.4   2.5   3.7   4.9   6.0   7.2   8.3   9.5001170
LOAD POINT    33.8  34.1  34.5  34.8  35.2  35.5  35.9  36.2  36.6  36.9001200
EMISS DATA    10.7  11.8  13.0  14.1  15.3  16.5  17.6  18.8  19.9  21.1001210
SPEED POINT  800.0                                                    001240
LOAD POINT   -3.80.0001   0.2   0.3   0.5   0.7   0.9   1.0   1.2   1.4000230
EMISS DATA     0.2  18.1  17.1  16.1  15.1  14.1  13.1  12.1  11.1  10.1001260
LOAD POINT     1.5   1.7   1.9   2.0   2.2   2.4   2.6   2.7   2.9   3.1001290
EMISS DATA     9.1   8.1   7.1   6.1   5.1   4.1   3.1   2.1   1.1   0.1001300
SPEED POINT 1000.0                                                    001330
LOAD POINT   -8.80.0001  13.2  26.4  39.6  52.9  66.1  79.3  92.5 105.7000320
EMISS DATA     0.2   0.5   0.3   0.3   0.2   0.2   0.1   0.1   0.1   0.1001350
LOAD POINT   118.9 132.1 145.4 158.6 171.8 185.0 198.2 211.4 224.6 237.9001380
EMISS DATA     0.1   0.1   0.1   0.3   1.4  10.6  82.7 469.1 615.8 544.4001390
SPEED POINT 1300.0                                                    001420
LOAD POINT   -16.30.0001  14.2  28.4  42.7  56.9  71.1  85.3  99.5 113.8000410
EMISS DATA     0.2   0.2   0.2   0.3   0.5   0.7   0.9   0.8   0.7   0.6001440
LOAD POINT   126.0 142.2 156.4 170.6 184.9 199.1 213.3 227.5 241.8 256.0001470
EMISS DATA     0.5   0.6   0.9   2.1   6.7  29.2 141.3 563.6 902.5 730.1001480
SPEED POINT 1500.0                                                    001510
LOAD POINT   -21.30.0001  14.8  29.6  44.4  59.2  74.0  88.8 103.6 118.4000500
```

Figure 2-4 Deck Setup for Program VSIME (continued)

```
EMISS DATA     0.2   0.4   0.5   0.6   0.6   0.4   0.3   0.2   0.1   0.1001530
LOAD POINT   133.2 148.0 162.8 177.6 192.4 207.2 222.0 236.8 251.6 266.5001560
EMISS DATA     0.1   0.2   0.4   1.5   7.5  45.5 264.91068.01106.0 843.9001570
SPEED POINT 1900.0                                                    001600
LOAD POINT   -31.3   3.1  17.7  32.4  47.1  61.7  76.4  91.0 105.7 120.3001610
EMISS DATA     0.2   0.4   0.3   0.3   0.4   0.6   0.8   0.9   0.9   0.8001620
LOAD POINT   135.0 149.7 164.3 179.0 193.6 208.3 223.0 237.6 252.3 266.9001650
EMISS DATA     0.8   0.9   1.4   3.0   9.2  38.3 185.8 785.41711.01432.4001660
SPEED POINT 2200.0                                                    001690
LOAD POINT   -38.8   3.1  17.5  31.9  46.3  60.7  75.1  89.4 103.8 118.2001700
EMISS DATA     0.2   0.5   0.3   0.3   0.5   0.7   0.9   0.9   0.7   0.6001710
LOAD POINT   132.6 147.0 161.4 175.8 190.2 204.6 219.0 233.3 247.7 262.1001740
EMISS DATA     0.6   0.6   1.0   2.2   7.9  39.1 224.71072.61861.01617.3001750
SPEED POINT 2400.0                                                    001780
LOAD POINT   -43.8   3.1  17.7  32.3  46.9  61.5  76.1  90.7 105.4 120.0001790
EMISS DATA     0.2   0.4   0.3   0.3   0.4   0.6   0.7   0.7   0.5   0.4001830
LOAD POINT   134.6 149.2 163.8 178.4 193.0 207.6 222.3 236.9 251.5 266.1001830
EMISS DATA     0.4   0.4   0.7   1.6   6.4  35.6 229.01179.42240.01524.6001840
SPEED POINT 2600.0                                                    001870
LOAD POINT   -53.9   3.1  17.7  32.4  47.1  61.8  76.5  91.2 105.9 120.6001880
EMISS DATA     0.2   0.6   0.2   0.2   0.3   0.5   0.7   0.8   0.7   0.5001890
LOAD POINT   135.3 150.0 164.6 179.3 194.0 208.7 223.4 238.1 252.8 267.5001920
EMISS DATA     0.3   0.3   0.3   0.5   1.5   6.8  45.7 319.21421.31986.3001930
SPEED POINT 3300.0                                                    001960
LOAD POINT   -66.4   3.1  15.4  27.8  40.2  52.6  65.0  77.4  89.8 102.1001970
EMISS DATA     0.2   0.4   0.2   0.3   0.3   0.4   0.5   0.5   0.5   0.4001980
LOAD POINT   114.5 126.9 139.3 151.7 164.1 176.5 188.8 201.2 213.6 226.0002010
EMISS DATA     0.4   0.4   0.5   0.9   2.3   8.5  41.6 228.61105.72524.0002020
SPEED POINT 3800.0                                                    002050
LOAD POINT   -78.90.0001  10.8  21.6  32.4  43.2  54.1  64.9  75.7  86.5001040
EMISS DATA     0.2   1.7   0.4   0.3   0.4   0.6   1.0   1.3   1.3   1.2002070
LOAD POINT    97.3 108.1 118.9 129.7 140.5 151.4 162.2 173.0 183.8 194.6002100
EMISS DATA     1.0   0.9   0.9   1.1   2.0   5.5  22.5 127.2 826.33365.0002110
DATA          HC
SPEED POINT  650.0                                                    002170
LOAD POINT 0.0001  30.6  30.9  31.3  31.7  32.0  32.4  32.7  33.1  33.4000140
EMISS DATA     3.0   3.0   5.0   7.1   9.1  11.2  13.2  15.3  17.3  19.4002190
LOAD POINT    33.8  34.1  34.5  34.8  35.2  35.5  35.9  36.2  36.6  36.9002220
EMISS DATA    21.4  23.5  25.5  27.6  29.6  31.7  33.7  35.8  37.8  39.9002230
SPEED POINT  800.0                                                    002260
LOAD POINT   -3.80.0001   0.2   0.3   0.5   0.7   0.9   1.0   1.2   1.4000230
EMISS DATA     3.0  52.2  49.5  46.8  44.0  41.3  38.6  35.9  33.1  30.4002280
LOAD POINT     1.5   1.7   1.9   2.0   2.2   2.4   2.6   2.7   2.9   3.1002310
EMISS DATA    27.7  24.9  22.2  19.5  16.7  14.0  11.3   8.6   5.8   3.1002320
SPEED POINT 1000.0                                                    002350
LOAD POINT   -8.80.0001  13.2  26.4  39.6  52.9  66.1  79.3  92.5 105.7000320
EMISS DATA     3.0   6.2   2.5   2.0   2.3   2.9   3.3   3.3   2.8   2.2002370
LOAD POINT   118.9 132.1 145.4 158.6 171.8 185.0 198.2 211.4 224.6 237.9002400
```

Figure 2-4. Deck Setup for Program VSIME (continued)

```
EMISS DATA      2.0   2.0   2.0   2.5   5.0  12.6  36.3  93.7 102.3  94.4002410
SPEED POINT 1300.0                                                    002440
LOAD POINT   -16.30.0001  14.2  28.4  42.7  56.9  71.1  85.3  99.5 113.8002410
EMISS DATA      3.0   2.8   4.2   5.7   6.7   6.3   5.0   3.5   2.3   1.5002460
LOAD POINT   128.0 142.2 156.4 170.6 184.9 199.1 213.3 227.5 241.8 256.0002490
EMISS DATA      1.4   1.4   1.4   2.0   4.1  10.5  30.7  83.6 164.2 164.2002500
SPEED POINT 1500.0                                                    002530
LOAD POINT   -21.30.0001  14.8  29.6  44.4  59.2  74.0  88.8 103.6 118.4002500
EMISS DATA      3.0   6.0   5.0   5.2   5.5   5.3   4.5   3.3   2.3   1.6002550
LOAD POINT   133.2 148.0 162.8 177.6 192.4 207.2 222.0 236.8 251.6 266.5002590
EMISS DATA      1.4   1.4   1.4   1.9   4.0  10.9  33.6  95.6 163.6 163.4002590
SPEED POINT 1900.0                                                    002620
LOAD POINT   -31.3   3.1  17.7  32.4  47.1  61.7  76.4  91.0 105.7 120.3002630
EMISS DATA      3.0   9.7   4.9   3.6   3.1   2.8   2.4   1.9   1.5   1.5002640
LOAD POINT   135.0 149.7 164.3 179.0 193.6 208.3 223.0 237.6 252.3 266.9002670
EMISS DATA      1.5   1.5   1.5   2.5   5.5  14.8  44.2 118.5 204.6 180.8002680
SPEED POINT 2200.0                                                    002710
LOAD POINT   -38.8   3.1  17.5  31.9  46.3  60.7  75.1  89.4 103.8 118.2002720
EMISS DATA      3.0  11.5   3.0   1.8   1.7   1.9   2.0   2.0   1.8   1.6002730
LOAD POINT   132.6 147.0 161.4 175.8 190.2 204.6 219.0 233.3 247.7 262.1002760
EMISS DATA      1.6   1.6   1.6   2.3   4.9  13.2  41.7 122.9 224.9 205.3002770
SPEED POINT 2400.0                                                    002800
LOAD POINT   -43.8   3.1  17.7  32.3  46.9  61.5  76.1  90.7 105.4 120.0002810
EMISS DATA      3.0   3.7   1.3   1.2   1.4   1.9   2.3   2.2   1.8   1.3002820
LOAD POINT   134.6 149.2 163.8 178.4 193.0 207.6 222.3 236.9 251.5 266.1002850
EMISS DATA      1.2   1.2   1.2   1.2   2.1   6.2  22.9  82.5 194.7 171.7002860
SPEED POINT 2600.0                                                    002890
LOAD POINT   -53.9   3.1  17.7  32.4  47.1  61.8  76.5  91.2 105.9 120.6002900
EMISS DATA      3.0   1.3   0.8   0.9   1.2   1.4   1.5   1.4   1.1   0.8002910
LOAD POINT   135.3 150.0 164.6 179.3 194.0 208.7 223.4 238.1 252.8 267.5002940
EMISS DATA      0.8   0.8   0.8   1.0   2.2   6.6  23.8  79.4 172.1 146.1002950
SPEED POINT 3300.0                                                    002980
LOAD POINT   -66.4   3.1  15.4  27.8  40.2  52.6  65.0  77.4  89.8 102.1002990
EMISS DATA      3.0   0.7   0.4   0.4   0.5   0.6   0.8   0.8   0.8   0.7003000
LOAD POINT   114.5 126.9 139.3 151.7 164.1 176.5 188.8 201.2 213.6 226.0003030
EMISS DATA      0.7   0.6   0.7   1.1   2.0   4.9  14.8  49.1 144.8 259.8003040
SPEED POINT 3800.0                                                    003070
LOAD POINT   -78.90.0001  10.8  21.6  32.4  43.2  54.1  64.9  75.7  86.5001040
EMISS DATA      3.0   3.5   0.6   0.4   0.4   0.7   1.0   1.4   1.5   1.4003090
LOAD POINT    97.3 108.1 118.9 129.7 140.5 151.4 162.2 173.0 183.8 194.6003120
EMISS DATA      1.2   1.0   0.9   0.9   1.4   3.0   9.0  34.8 142.5 394.5003130

6/7/8/9 MULTIPLE PUNCH IN COL. 1  END OF FILE CARD
```

Figure 2-4. Deck Setup for Program VSIME (continued)

SECTION 3

SIMULATION RESULTS

3.1 INTRODUCTION

The VEHSIM and VSIME programs described in the previous section were utilized to study fuel economy and emission effects for various vehicle/engine/driving cycle combinations. A baseline study was conducted in which computer runs were made for three engine/vehicle combinations, representing small, medium, and large size vehicles, and for eight driving cycles. An investigation of fuel economy and emission effects due to perturbing vehicle weight was also conducted. The effects were examined by increasing the inertia weight of each baseline vehicle by 300 and 600 lbs. Each baseline vehicle/engine combination was simulated over each of the eight base line driving cycles at these two additional weights. Three of the transient driving cycles (LA-4, HWY, NYC) were modified by perturbing their acceleration/deceleration rates by a factor of approximately 1.5 and 2.0. These perturbed cycles were run for each of the baseline vehicles to examine the effects of variable vehicle duty cycle. A study of emission sensitivity to vehicle emission control logics was also performed. A 1976 Chevrolet Nova (305 CID) was simulated for this study using two control logics which were developed by DOT (Ref. 3) to optimize fuel economy for each of two emission constraints.

All driving cycles and engine fuel and emission maps used in this study were supplied by EPA. Specific vehicle data and specific criteria for implementing computational procedures were established by Aerospace with the concurrence of the EPA task officer.

3.2 BASELINE CASES

The three engine/vehicle combinations defined for the baseline analysis were:

1. a 1975 Honda (2000 lbs IW, 90.8 CID)
2. a 1977 Buick (3500 lbs IW, 231 CID)
3. a 1975 Chevrolet (5000 lbs IW, 350 CID)

The specific vehicle data used in the simulation are shown in Tables 3-1 through 3-3.

The eight driving cycles utilized for the study were:

1. the EPA "City Cycle" (LA-4),
2. the EPA "Highway Driving Cycle" (HWY),
3. the EPA "Congested Freeway Driving Cycle" (CFDC),
4. a "15 mph Driving Cycle" (LD-15),
5. the "New York City Cycle" (NYC),
6. Steady State Cruising (60SS) at 60 mph,
7. Steady State Cruising (70SS) at 70 mph,
8. Steady State Cruising (80SS) at 80 mph.

A complete set of simulation results in both tabular and graphical form was presented to EPA in Reference 4, providing instantaneous, cumulative, and total values for each engine/vehicle/cycle combination. Representative graphical outputs consisted of:

1. Driving Cycle Plot: displaying distance traveled and vehicle velocity (MPH) as functions of time.
2. Fuel Economy Plot: displaying instantaneous mpg, cumulative mpg, and fuel rate (gal/sec) as functions of time.
3. Emissions Plot (one for HC, CO, and NO_x): displaying instantaneous grams and cumulative grams divided by cumulative miles traveled as functions of time.

For each plot, the program annotates the final cumulative value automatically. Figures 3-1 through 3-6 illustrate the typical graphical output for the simulation of the 1977 Buick over the EPA Highway Cycle (HWY). For example, on the HC plot of Figure 3-4, at 420 seconds of simulated driving time, the instantaneous mass emitted is 0.001 grams and the cumulative emission rate is approximately 0.08 grams/mile. The final cumulative emission rate for HC as indicated in Figure 3-4 is 0.069 grams/mile.

For simplicity in summarizing the voluminous data developed in this study, final results only are presented, using a tabular

Table 3-1. Honda Vehicle Data

Test Vehicle	1975 HONDA CVCC
Inertia Weight	2000 lbs
Frontal Area	16.97 ft^2
Aerodynamic Drag	0.50
Tire Rolling Circumference	6.158 ft
Rear Axle Ratio	4.73:1
Wheel Inertia	0.90 $lb\text{-}ft\text{-}sec^2$
Drive Shaft Inertia	0.04 $lb\text{-}ft\text{-}sec^2$
Torque Converter	LOCKED UP
Engine Inertia	0.05 $lb\text{-}ft\text{-}sec^2$
Engine	90.8 CID
Drive Converter Data	CODY2
Coast Converter Data	COCY2
Shift Logic	M4-2
Accessories	LFANA
Gear Ratios	3.18/1.82/1.18/0.85

Table 3-2. Buick Vehicle Data

Test Vehicle	1977 BUICK
Inertia Weight	3500 lbs
Frontal Area	19.04 ft^2
Aerodynamic Drag	0.511
Tire Rolling Circumference	5.969 ft
Rear Axle Ratio	2.56:1
Wheel Inertia	0.90 $lb\text{-}ft\text{-}sec^2$
Drive Shaft Inertia	0.04 $lb\text{-}ft\text{-}sec^2$
Torque Converter	
a) pump inertia	0.116 $lb\text{-}ft\text{-}sec^2$
b) turbine inertia	0.032 $lb\text{-}ft\text{-}sec^2$
Engine Inertia	0.080 $lb\text{-}ft\text{-}sec^2$
Engine	231 CID
Drive Converter Data	CODY2
Coast Converter Data	COCY2
Shift Logic	TEST2
Accessories	LFANA
Gear Ratios	2.52/1.52/1.00

Table 3-3. Chevrolet Vehicle Data

Test Vehicle	1975 CHEVROLET
Inertia Weight	5000 lbs
Frontal Area	24.2 ft^2
Aerodynamic Drag	0.55
Tire Rolling Circumference	7.094 ft
Rear Axle Ratio	3.08:1
Wheel Inertia	0.90 $lb\text{-}ft\text{-}sec^2$
Drive Shaft Inertia	0.04 $lb\text{-}ft\text{-}sec^2$
Torque Converter	
a) pump inertia	0.116 $lb\text{-}ft\text{-}sec^2$
b) turbine inertia	0.032 $lb\text{-}ft\text{-}sec^2$
Engine Inertia	0.101 $lb\text{-}ft\text{-}sec^2$
Engine	350 CID
Drive Converter Data	CODY2
Coast Converter Data	CDCY2
Shift Logic	TEST2
Accessories	LFANA
Gear Ratios	2.52/1.52/1.00

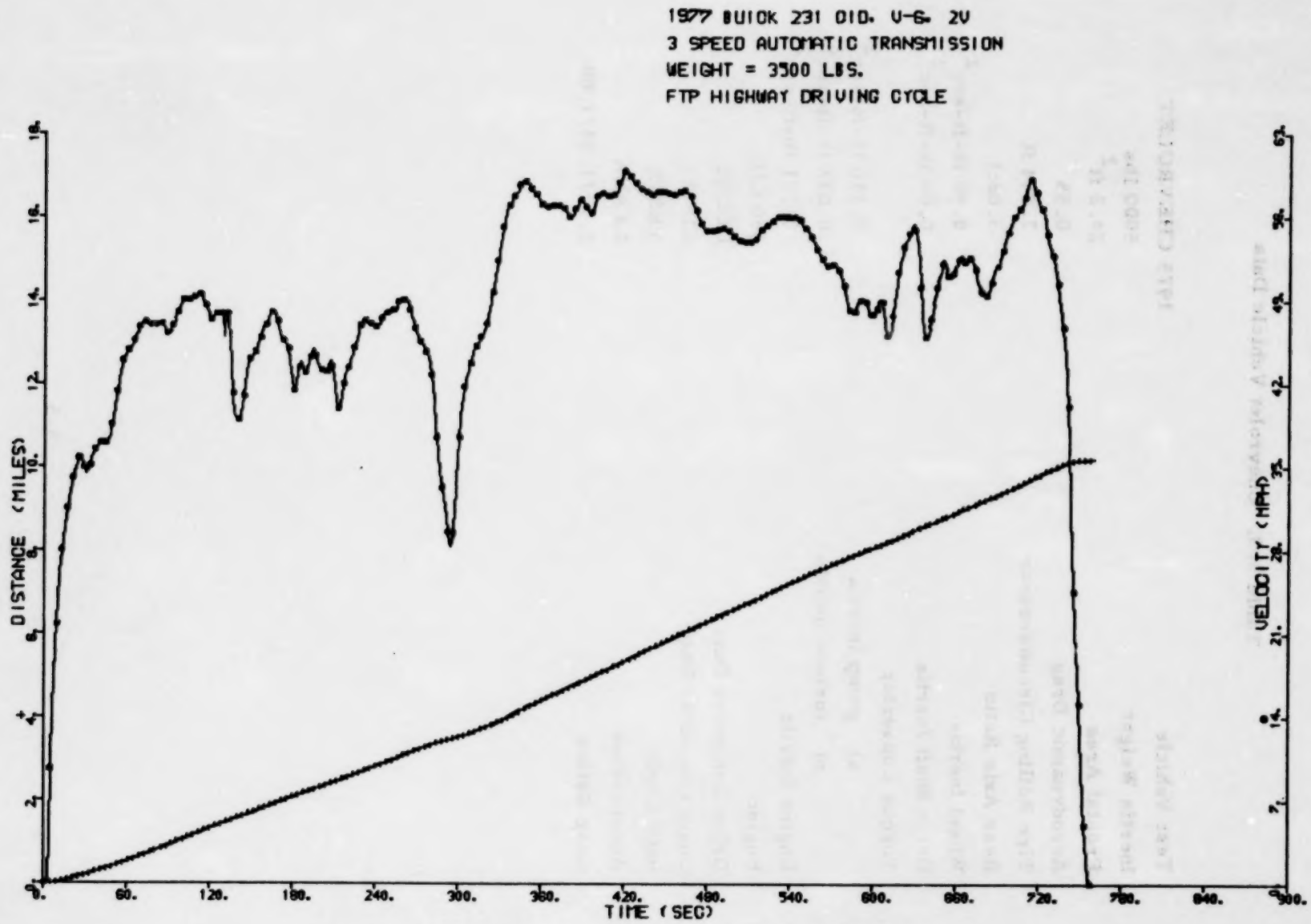

Figure 3-1. Distance, Velocity Display

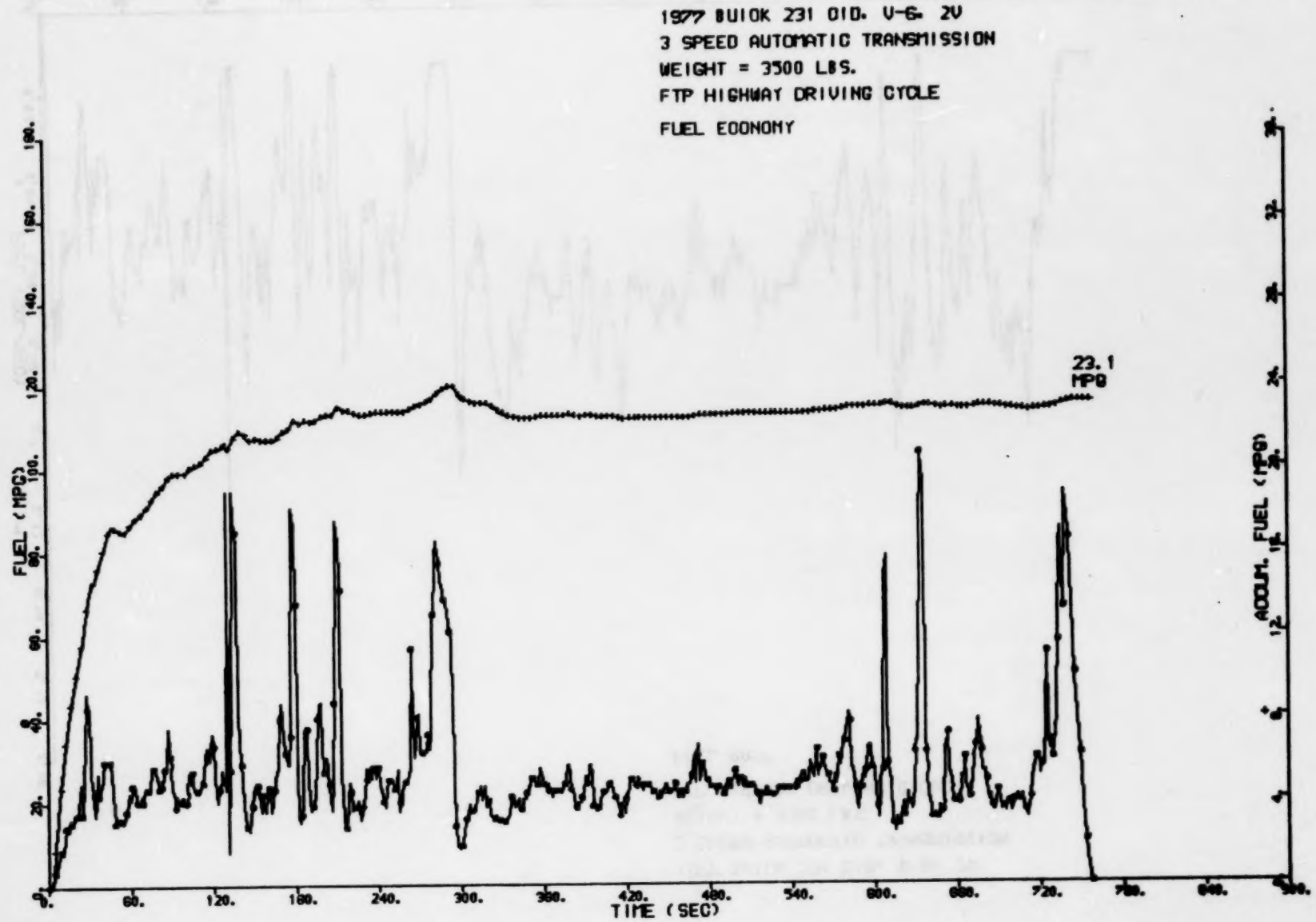

Figure 3-2. Fuel Economy Display

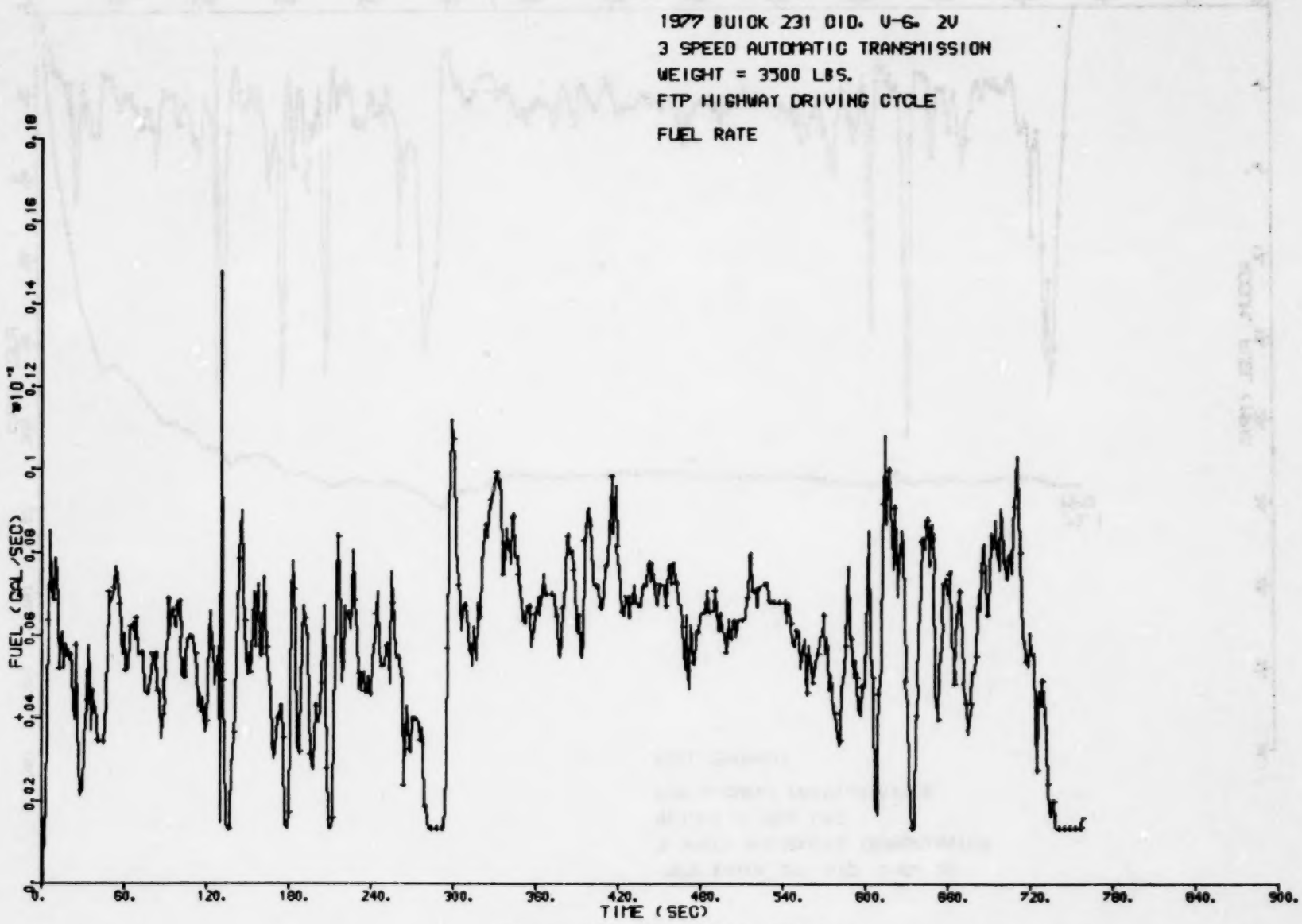

Figure 3-3. Fuel Rate Display

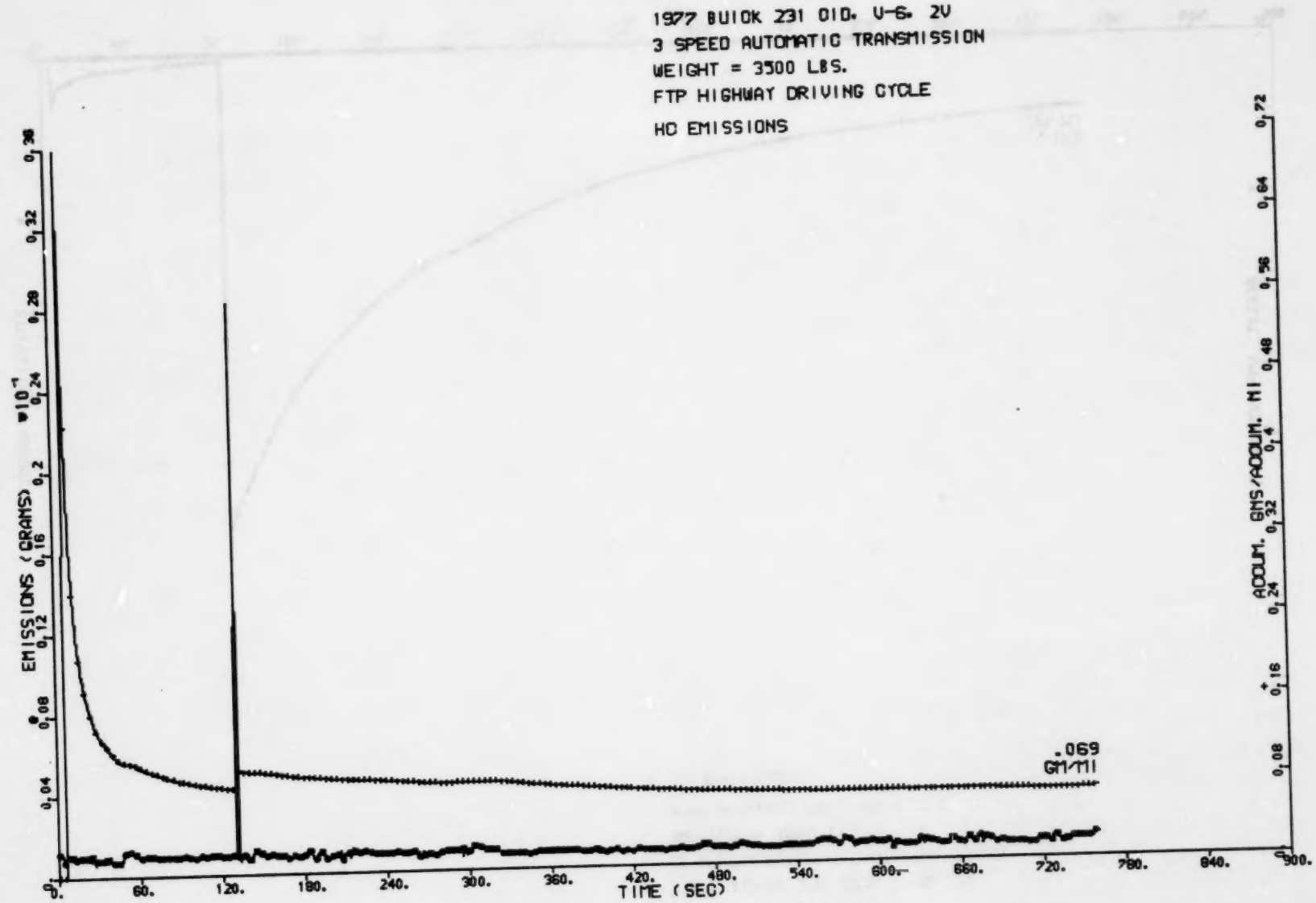

Figure 3-4. HC Emissions Display

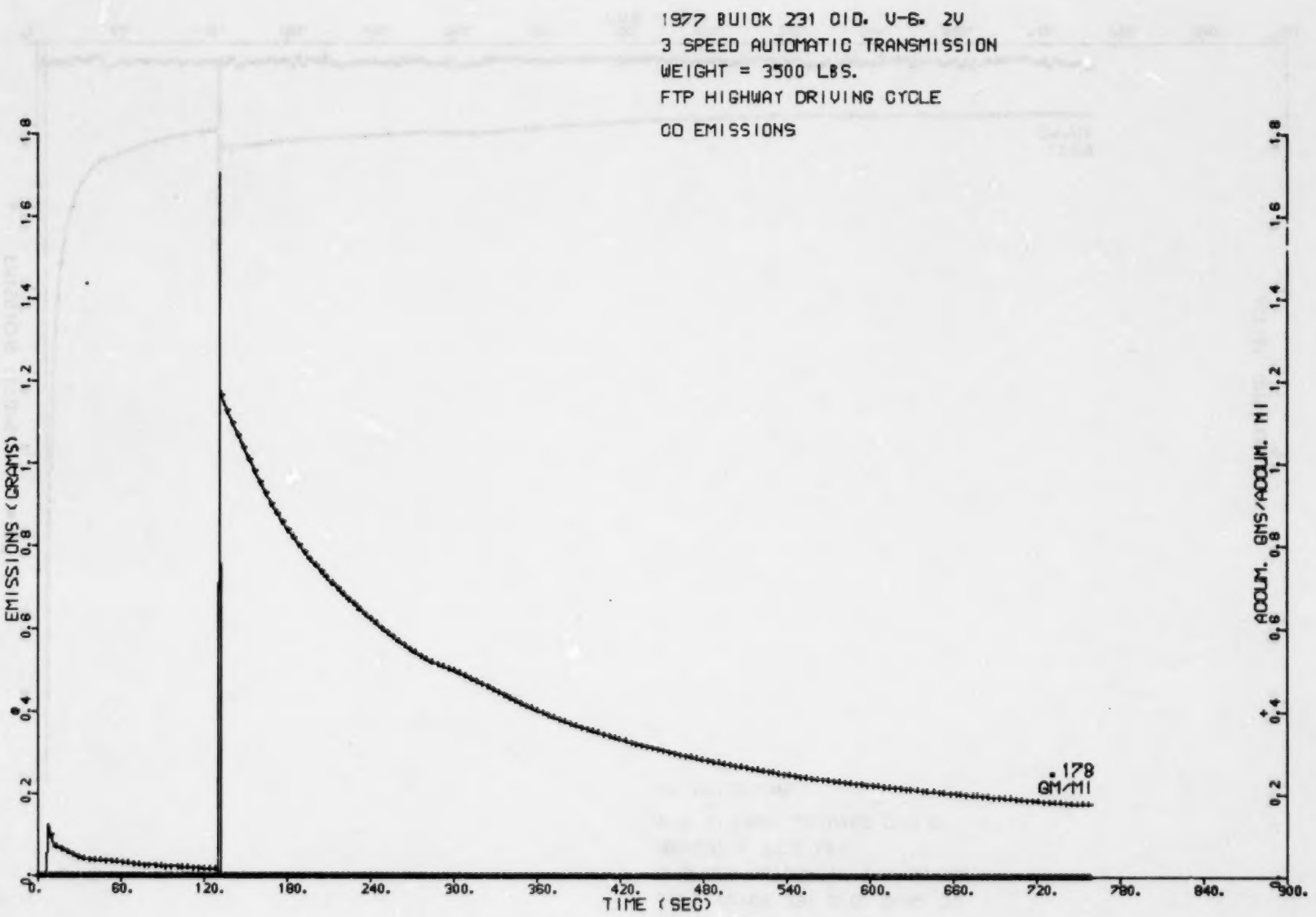

Figure 3-5. CO Emissions Display

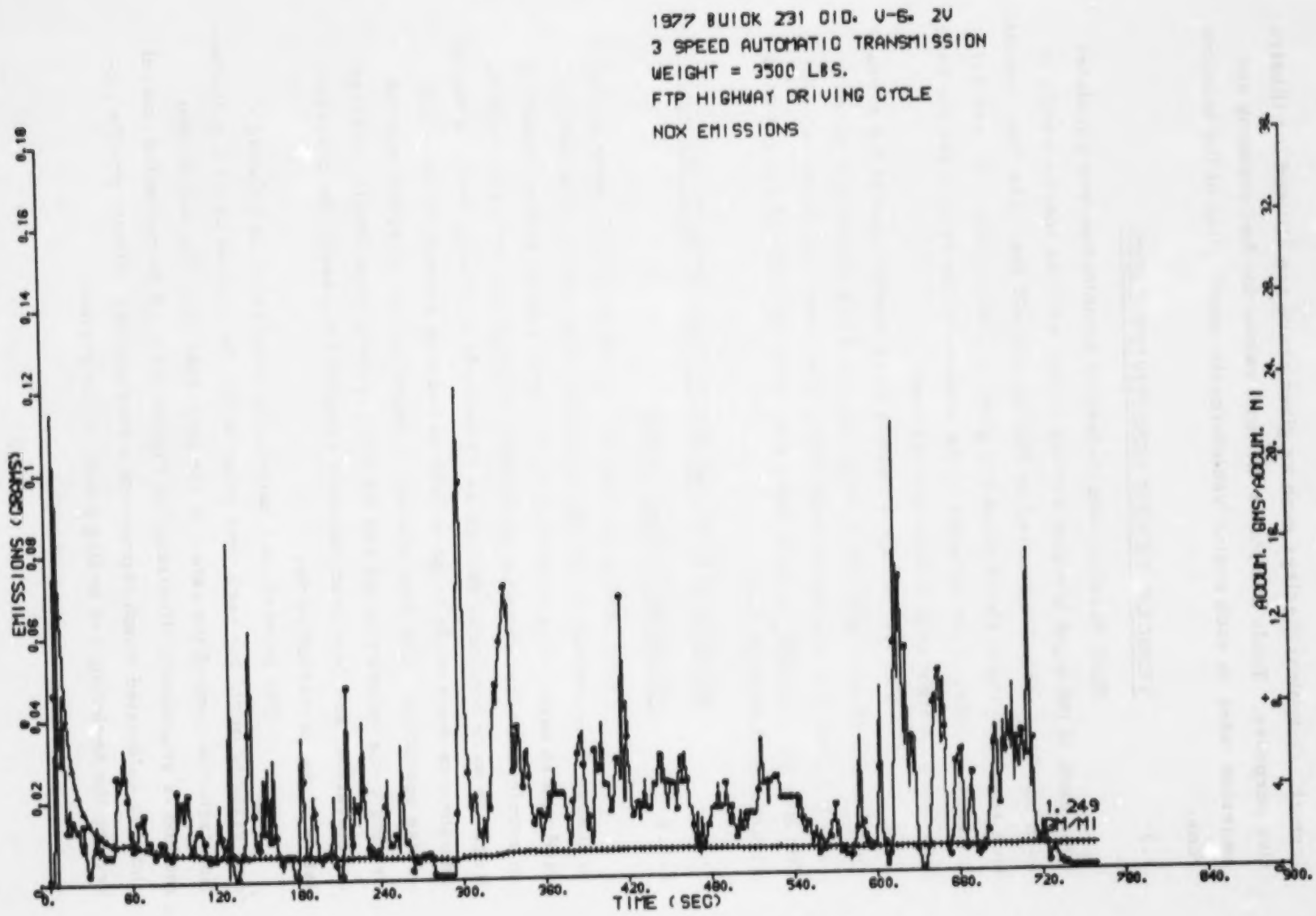

Figure 3-6. NO_x Emissions Display

format. Graphical displays such as given above are utilized for illustrative purposes. Table 3-4 shows the final values for fuel economy and emission rates on each engine/vehicle/cycle combination of the baseline runs.

3.3 VEHICLE WEIGHT SENSITIVITY CASES

Each baseline vehicle/engine combination was simulated over each of the eight baseline driving cycles with the inertia weight of each baseline vehicle increased by 300 lbs and 600 lbs. The final cumulative results of these simulations are given in Tables 3-5, 3-6, and 3-7 for each vehicle. Also included in the tables are the results for the baseline inertia weight to facilitate comparisons.

The fuel economy results were plotted against the average speed (mph) of each baseline driving cycle and are shown in Figures 3-7, 3-8, and 3-9 (the cycle identifier is also noted for ready reference). The HC, CO, and NO_x results were similarily plotted and are shown in Figures 3-10 through 3-18.

3.4 ACCELERATION/DECELERATION SENSITIVITY CASES

3.4.1 Perturbed Driving Cycles

Three driving cycles, (NYC, HWY, LA-4), were modified to change their overall acceleration/deceleration rates. The method used was to segment each driving cycle into regimes, and to implement an acceleration/deceleration perturbation calculation for each regime. Regimes were nominally defined as 13 seconds of driving cycle, although adjustments were made on an individual basis to account for idle and cruise operation. The data utilized to represent each regime was the driving cycle velocity (mph) and the driving cycle time (sec). Average accelerations and decelerations were computed to assess the characteristics of the perturbed cycle.

The perturbation calculation consists of calculating a new velocity (mph) for each time point within the regime using a perturbation factor to control the extent of the perturbation. The calculation method is graphically illustrated in Figure 3-19. A perturbation control chord is calculated which represents a straight line velocity profile connecting the beginning and ending points of the regime.

Table 3-4. Baseline Simulation Results

VEHICLE	Driving Cycle	Fuel Economy (MPG)	Emissions (G/Mile) HC	CO	NO_x
GM350	LA-4	12.6	.20	.47	1.85
	HWY	17.2	.06	.50	2.54
	CFDC	15.6	.09	.33	2.56
	LD-15	11.0	.28	.26	2.00
	NYC	6.5	.56	2.67	2.54
	60SS	17.1	.04	.12	4.01
	70SS	15.8	.02	.09	6.15
	80SS	12.8	.01	.05	8.32
BUICK 231	LA-4	18.3	.17	.06	1.69
	HWY	23.1	.07	.18	1.25
	CFDC	21.6	.09	.02	1.74
	LD-15	16.1	.23	.05	1.66
	NYC	9.5	.47	.11	3.19
	60SS	21.8	.04	.01	1.62
	70SS	19.0	.03	.01	4.07
	80SS	16.7	.03	.01	7.95
HONDA	LA-4	24.2	1.53	3.21	2.11
	HWY	31.1	.22	1.42	2.43
	CFDC	28.7	.69	4.19	2.40
	LD-15	22.5	1.70	3.78	1.81
	NYC	13.5	3.93	9.82	3.11
	60SS	28.2	.02	.61	2.66
	70SS	24.8	.24	11.17	3.26
	80SS	18.1	1.21	52.82	5.39

Table 3-5. Honda Weight Sensitivity Results

Inertia Weight (Lbs.)	Driving Cycle	Fuel Economy (MPG)	Emissions (G/Mile) HC	CO	NO_x
2000	LA-4	24.2	1.53	3.21	2.11
	HWY	31.1	.22	1.42	2.43
	CFDC	28.7	.69	4.19	2.40
	LD-15	22.5	1.70	3.78	1.81
	NYC	13.5	3.93	9.82	3.11
	60SS	28.2	.02	.61	2.66
	70SS	24.8	.24	11.17	3.26
	80SS	18.1	1.21	52.82	5.39
2300	LA-4	23.4	1.63	4.47	2.45
	HWY	30.3	.26	2.04	2.75
	CFDC	27.7	.78	6.55	2.59
	LD-15	21.9	1.91	5.76	1.98
	NYC	13.1	4.17	12.43	3.41
	60SS	27.6	.02	.65	3.00
	70SS	24.0	.45	22.06	3.05
	80SS	17.7	1.35	58.76	5.14
2600	LA-4	22.7	1.74	6.11	2.76
	HWY	29.4	.30	3.12	2.95
	CFDC	26.8	.84	8.59	2.81
	LD-15	21.2	2.10	7.99	2.16
	NYC	12.7	4.40	16.06	3.84
	60SS	27.0	.03	.73	3.44
	70SS	23.3	.66	33.12	2.85
	80SS*	--	--	--	--

* MAX steady state speed for this weight was 79.4 MPH

Table 3-6. Buick Weight Sensitivity Results

Inertia Weight (Lbs.)	Driving Cycle	Fuel Economy (MPG)	Emissions (G/Mile) HC	CO	NO_x
3500	LA-4	18.3	.17	.06	1.69
	HWY	23.1	.07	.18	1.25
	CFDC	21.6	.09	.02	1.74
	LD-15	16.1	.23	.05	1.66
	NYC	9.5	.47	.11	3.19
	60SS	21.8	.04	.01	1.62
	70SS	19.0	.03	.01	4.07
	80SS	16.7	.03	.01	7.95
3800	LA-4	17.6	.17	.34	1.83
	HWY	22.5	.07	.28	1.39
	CFDC	20.9	.09	.05	1.97
	LD-15	15.6	.23	.05	1.93
	NYC	9.3	.49	1.14	3.43
	60SS	21.4	.04	.01	1.75
	70SS	18.7	.03	.01	4.23
	80SS	16.4	.03	.01	8.31
4100	LA-4	17.0	.18	.63	2.02
	HWY	21.9	.07	.30	1.56
	CFDC	20.3	.10	.52	2.19
	LD-15	15.1	.23	.05	2.27
	NYC	9.0	.50	1.82	3.76
	60SS	20.9	.04	.01	1.89
	70SS	18.4	.03	.01	4.39
	80SS	16.1	.03	.01	8.58

Table 3-7. Chevrolet Weight Sensitivity Results

Inertia Weight (Lbs.)	Driving Cycle	Fuel Economy (MPG)	Emissions (G/Mile) HC	CO	NO_x
5000	LA-4	12.6	.20	.47	1.85
	HWY	17.2	.06	.50	2.54
	CFDC	15.6	.09	.33	2.56
	LD-15	11.0	.28	.26	2.00
	NYC	6.5	.56	2.67	2.54
	60SS	17.1	.04	.12	4.01
	70SS	15.8	.02	.09	6.15
	80SS	12.8	.01	.05	8.32
5300	LA-4	12.4	.20	1.02	1.98
	HWY	16.9	.06	.68	2.74
	CFDC	15.3	.09	.60	2.67
	LD-15	10.8	.28	.36	2.06
	NYC	6.4	.59	5.56	2.71
	60SS	17.0	.04	.12	4.36
	70SS	15.5	.02	.09	6.45
	80SS	12.6	.01	.05	8.49
5600	LA-4	12.1	.21	1.85	2.14
	HWY	16.7	.06	.78	2.91
	CFDC	15.0	.10	1.36	2.77
	LD-15	10.5	.28	.53	2.23
	NYC	6.3	.64	9.28	2.79
	60SS	16.8	.04	.12	4.86
	70SS	15.2	.02	.08	6.74
	80SS	12.4	.01	.05	8.64

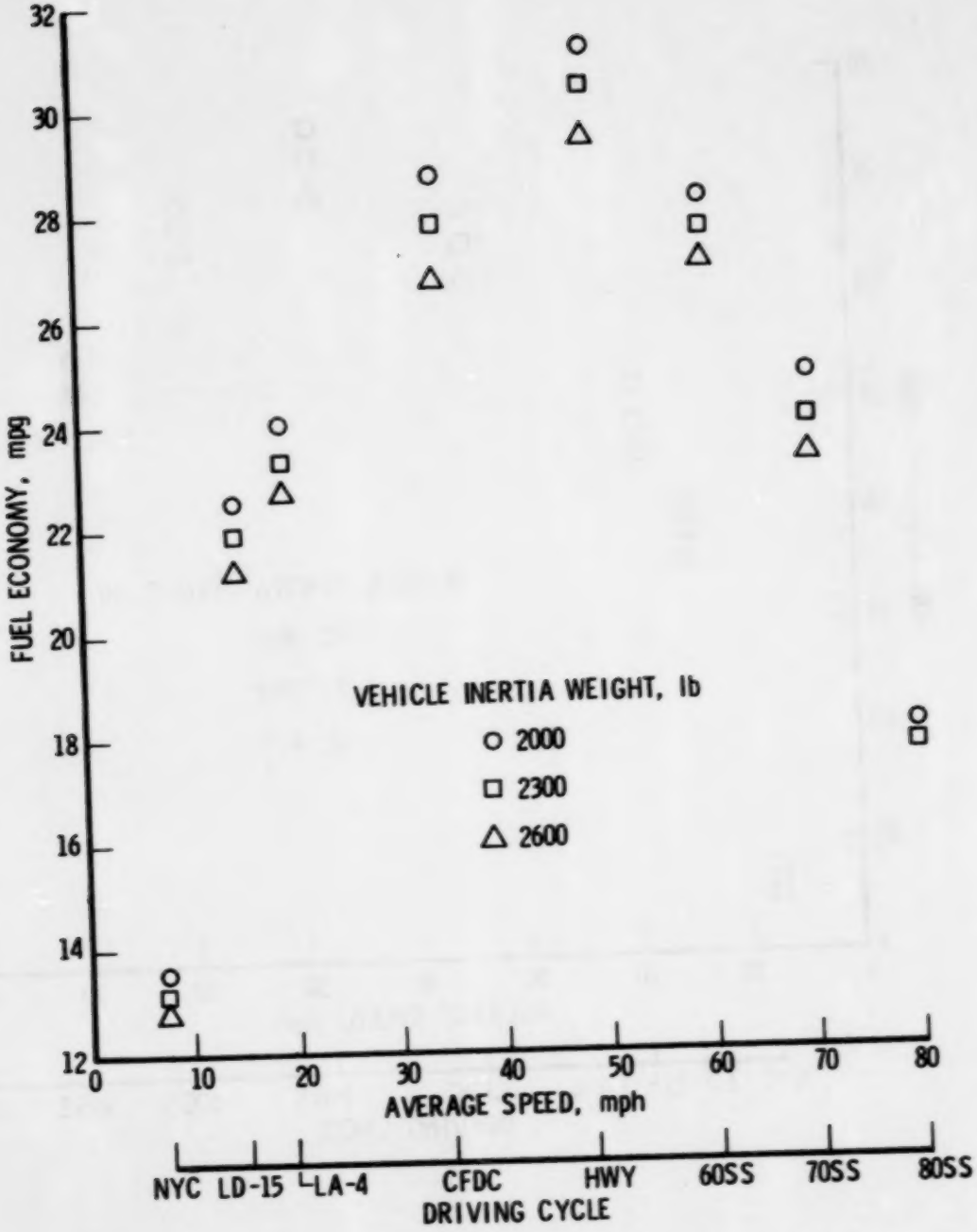

Figure 3-7. Honda Weight Sensitivity Results for Fuel Economy

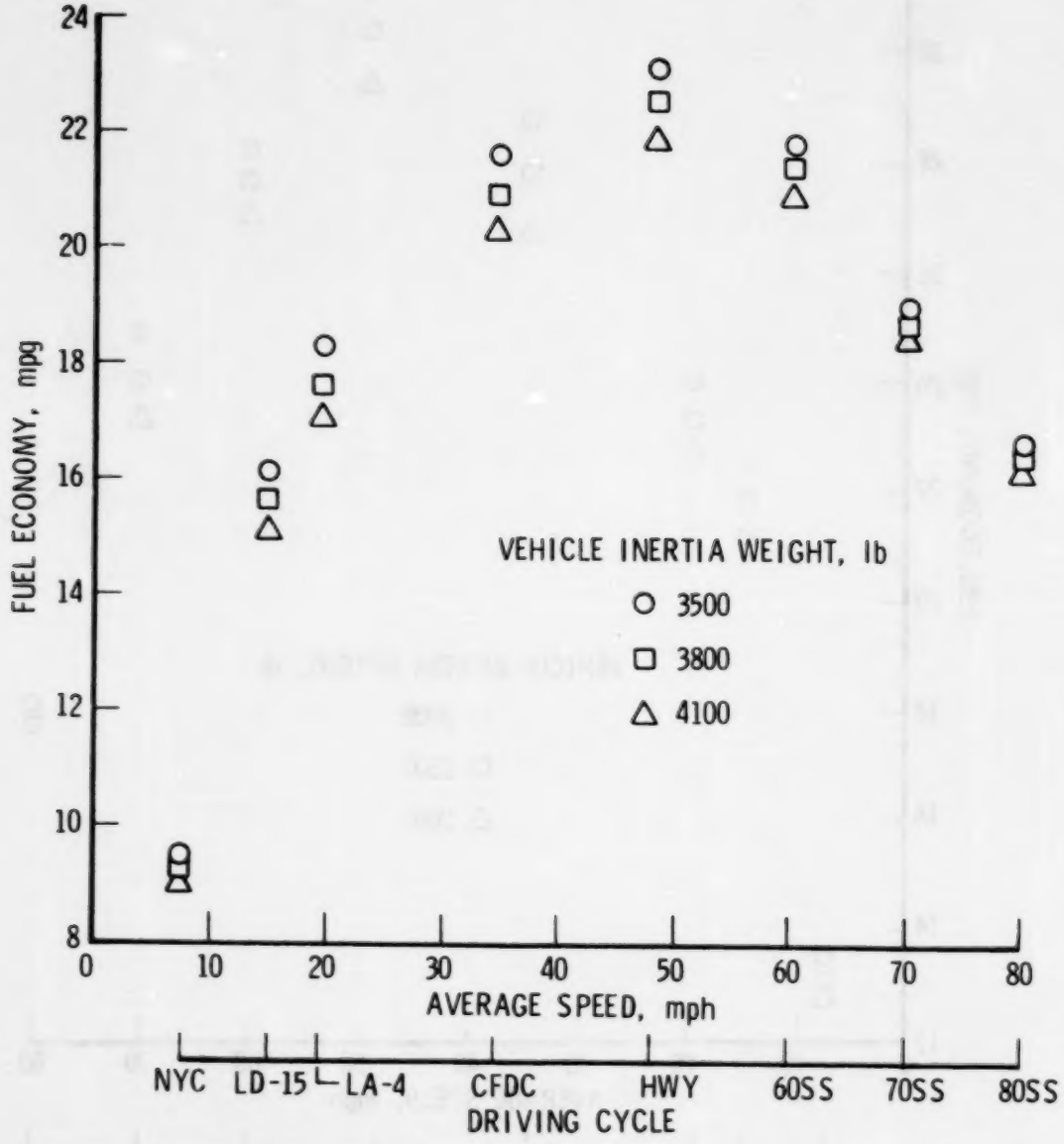

Figure 3-8. Buick Weight Sensitivity Results for Fuel Economy

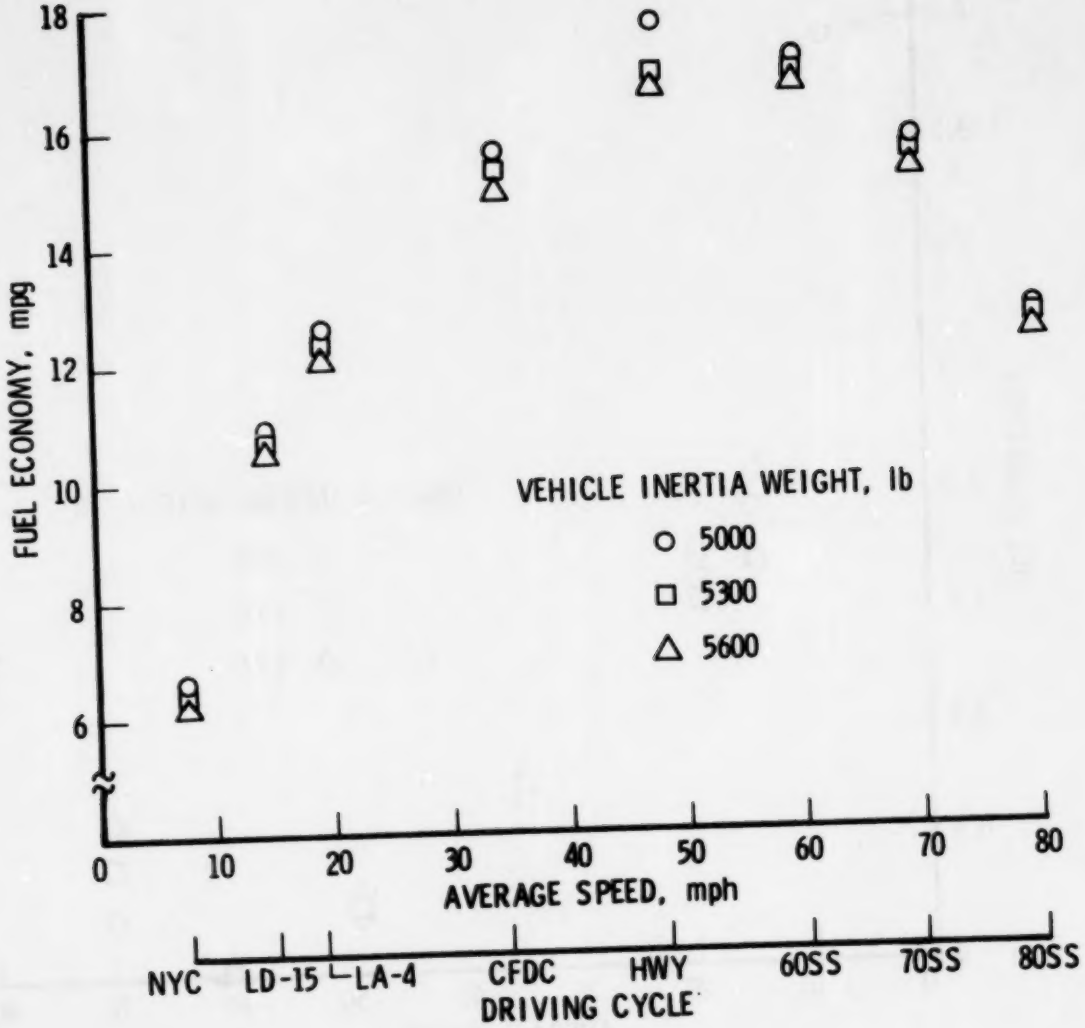

Figure 3-9. Chevrolet Weight Sensitivity Results for Fuel Economy

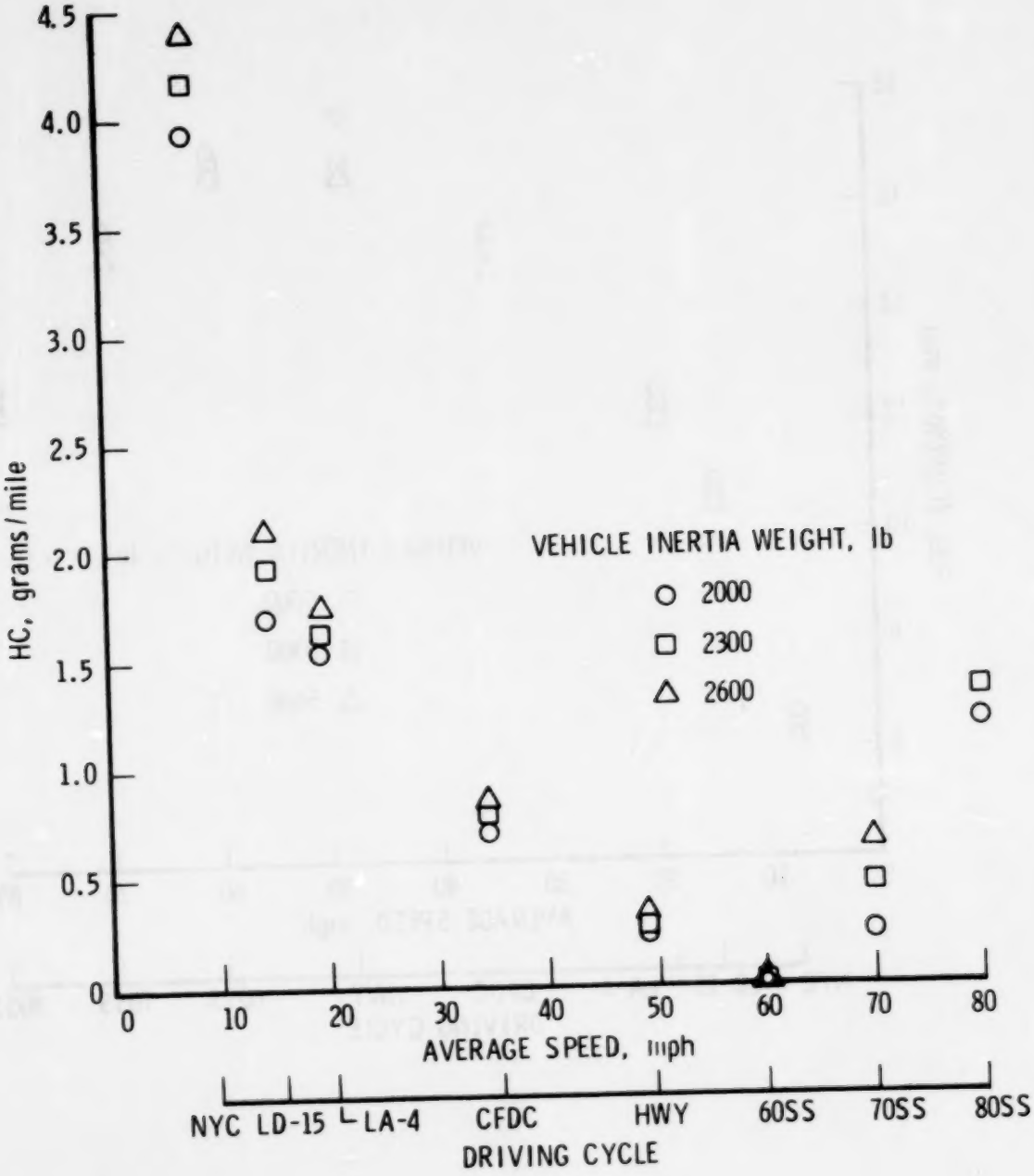

Figure 3-10. Honda Weight Sensitivity Results for HC

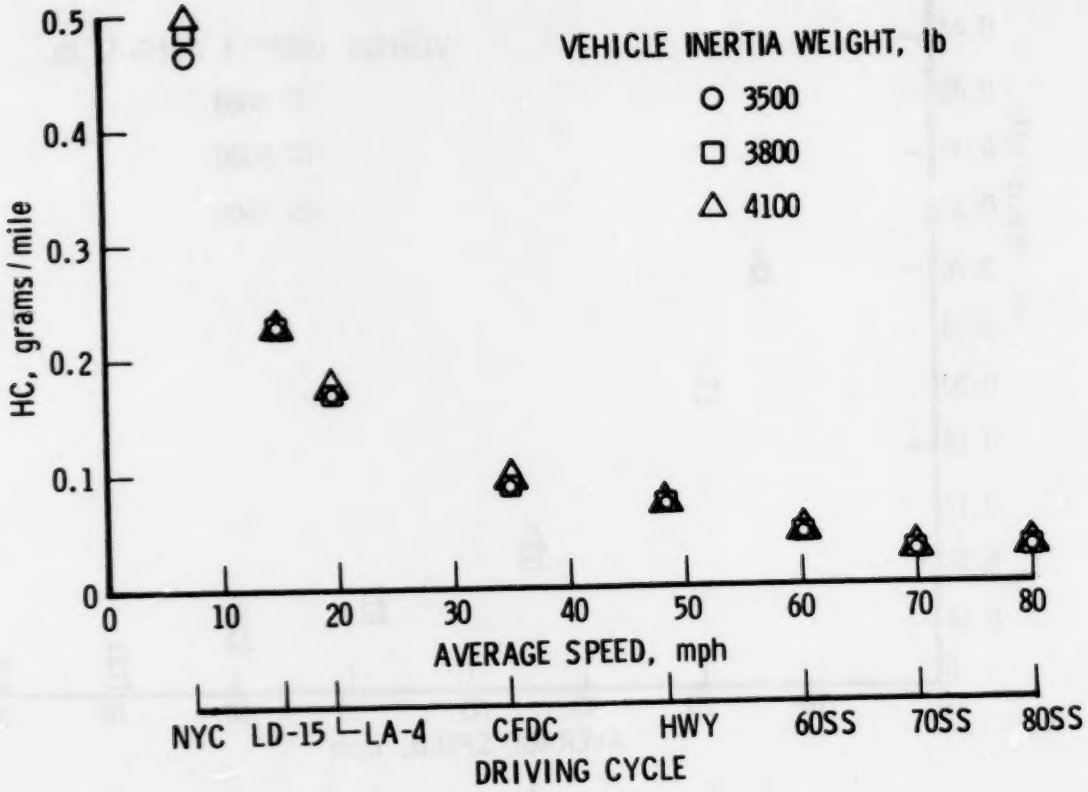

Figure 3-11. Buick Weight Sensitivity Results for HC

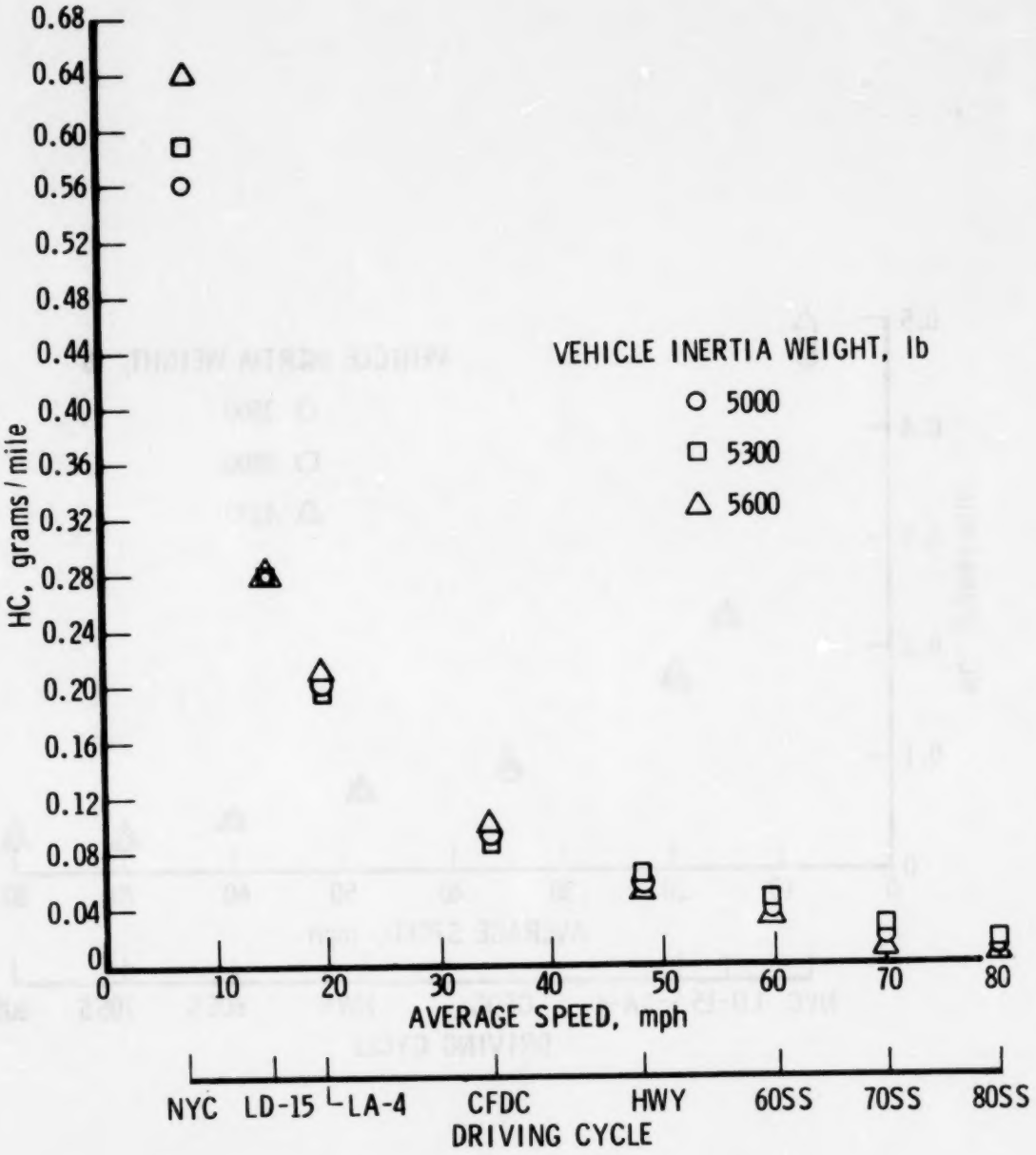

Figure 3-12. Chevrolet Weight Sensitivity Results for HC

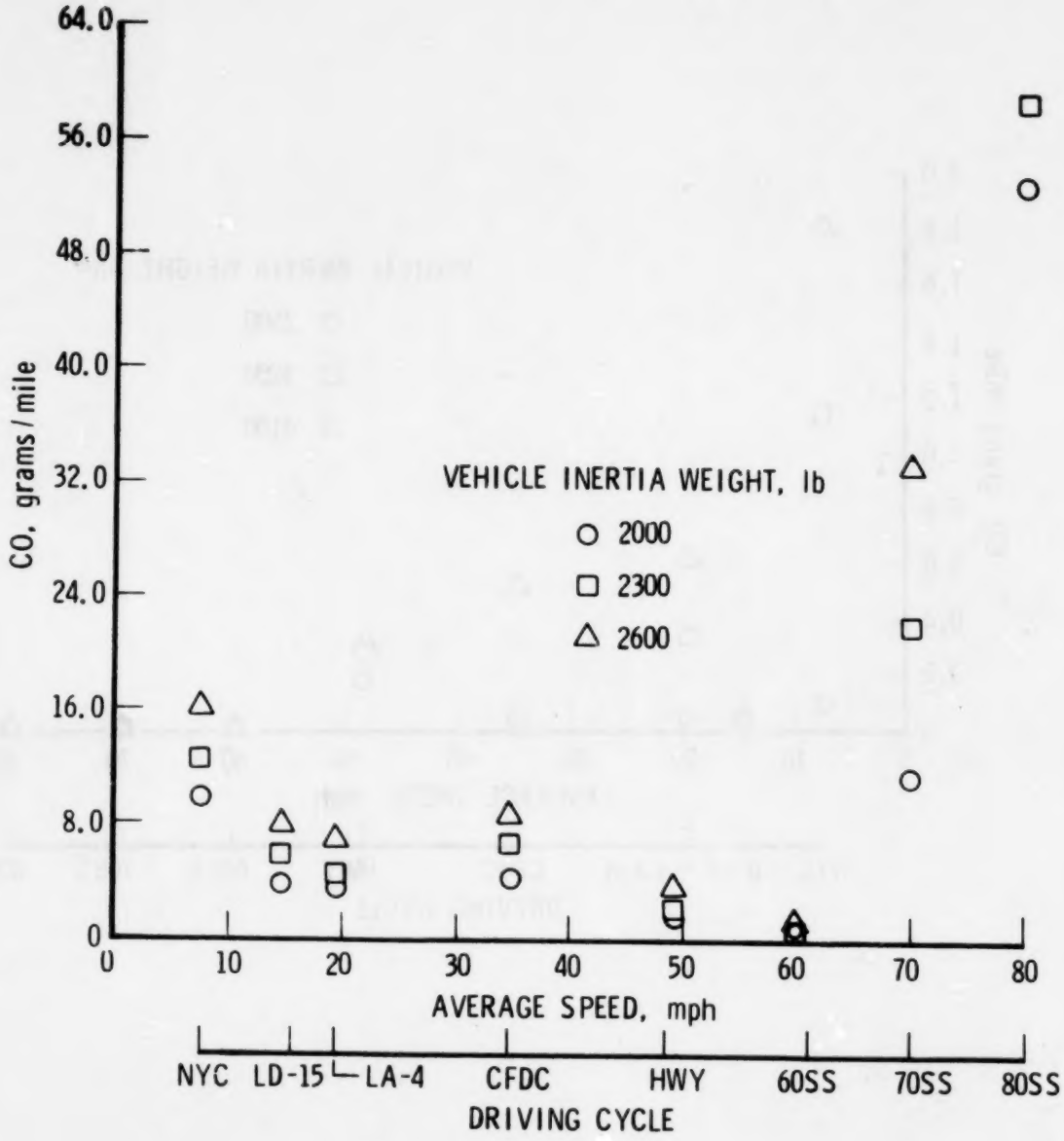

Figure 3-13. Honda Weight Sensitivity Results for CO

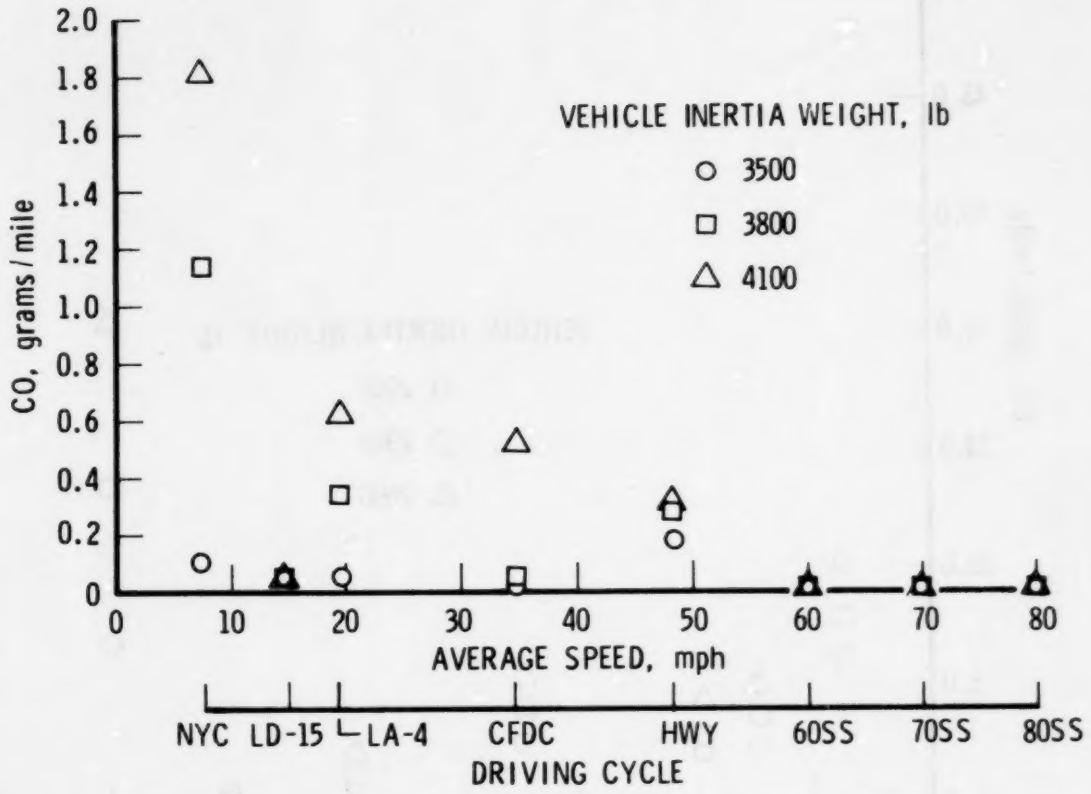

Figure 3-14. Buick Weight Sensitivity Results for CO

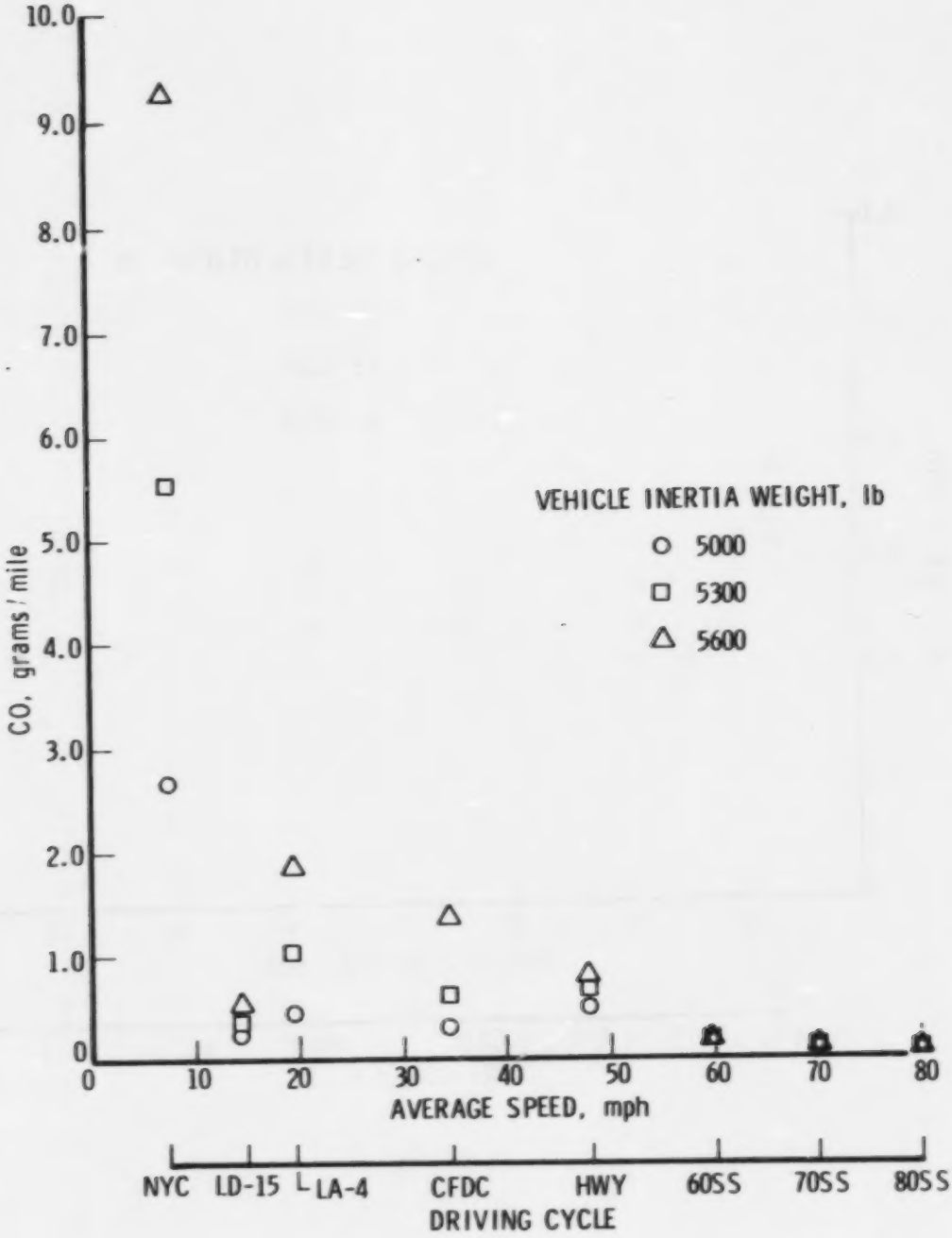

Figure 3-15. Chevrolet Weight Sensitivity Results for CO

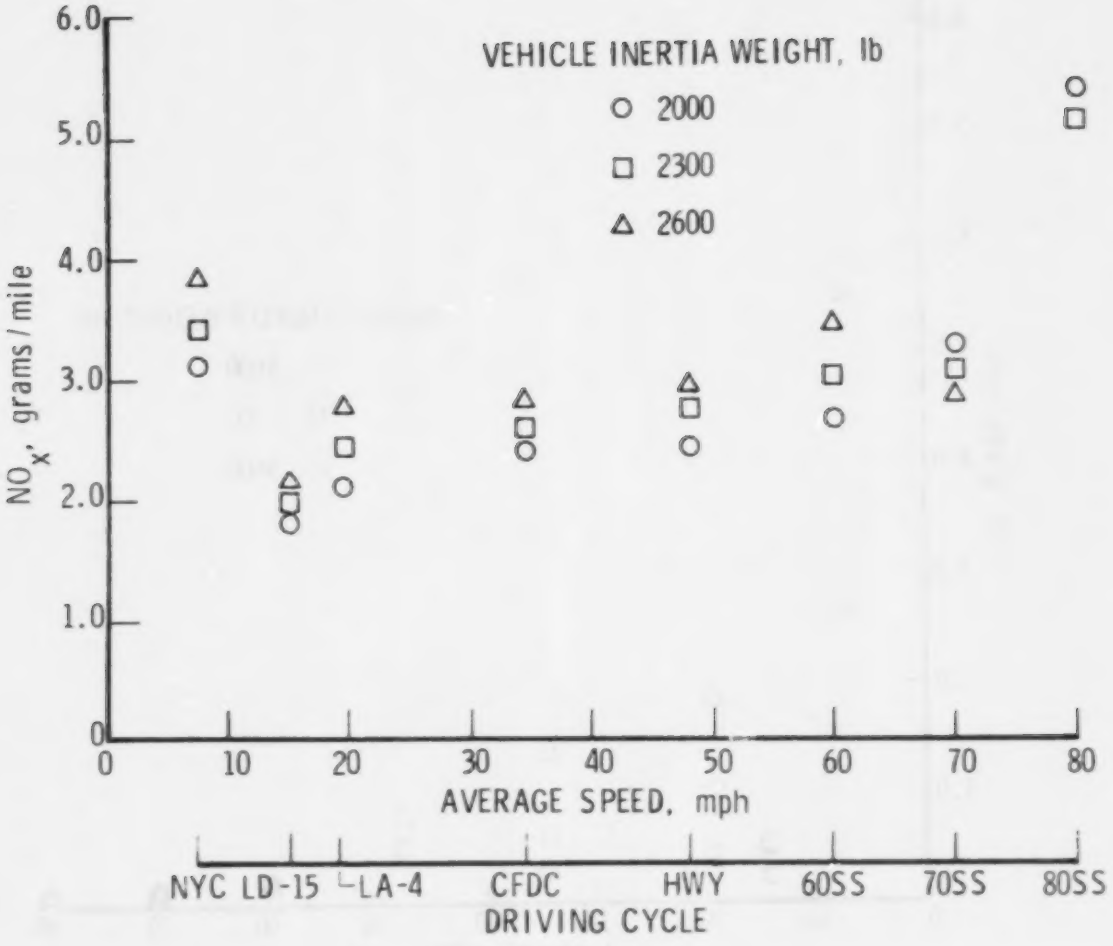

Figure 3-16. Honda Weight Sensitivity Results for NO_x

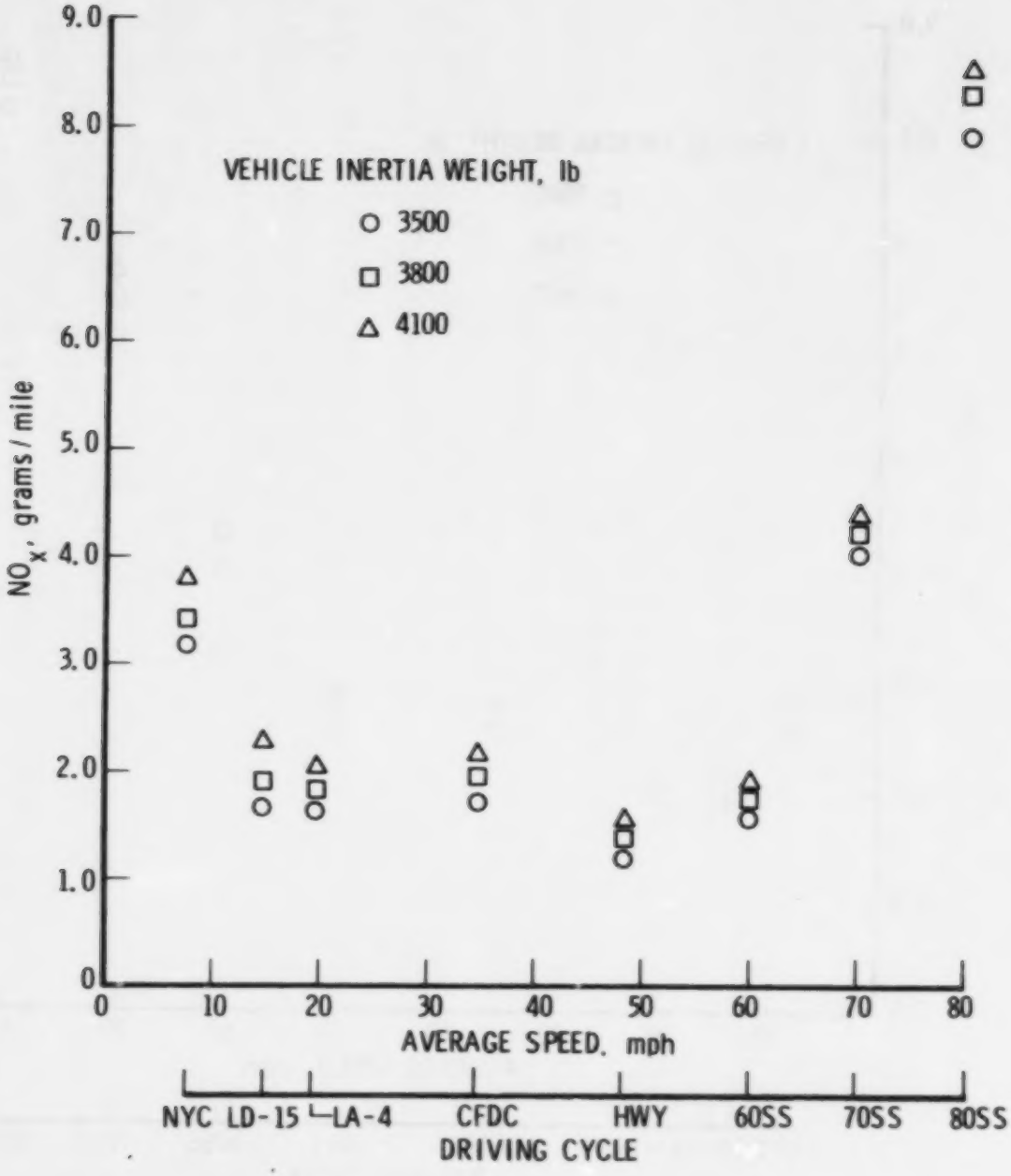

Figure 3-17. Buick Weight Sensitivity Results for NO_x

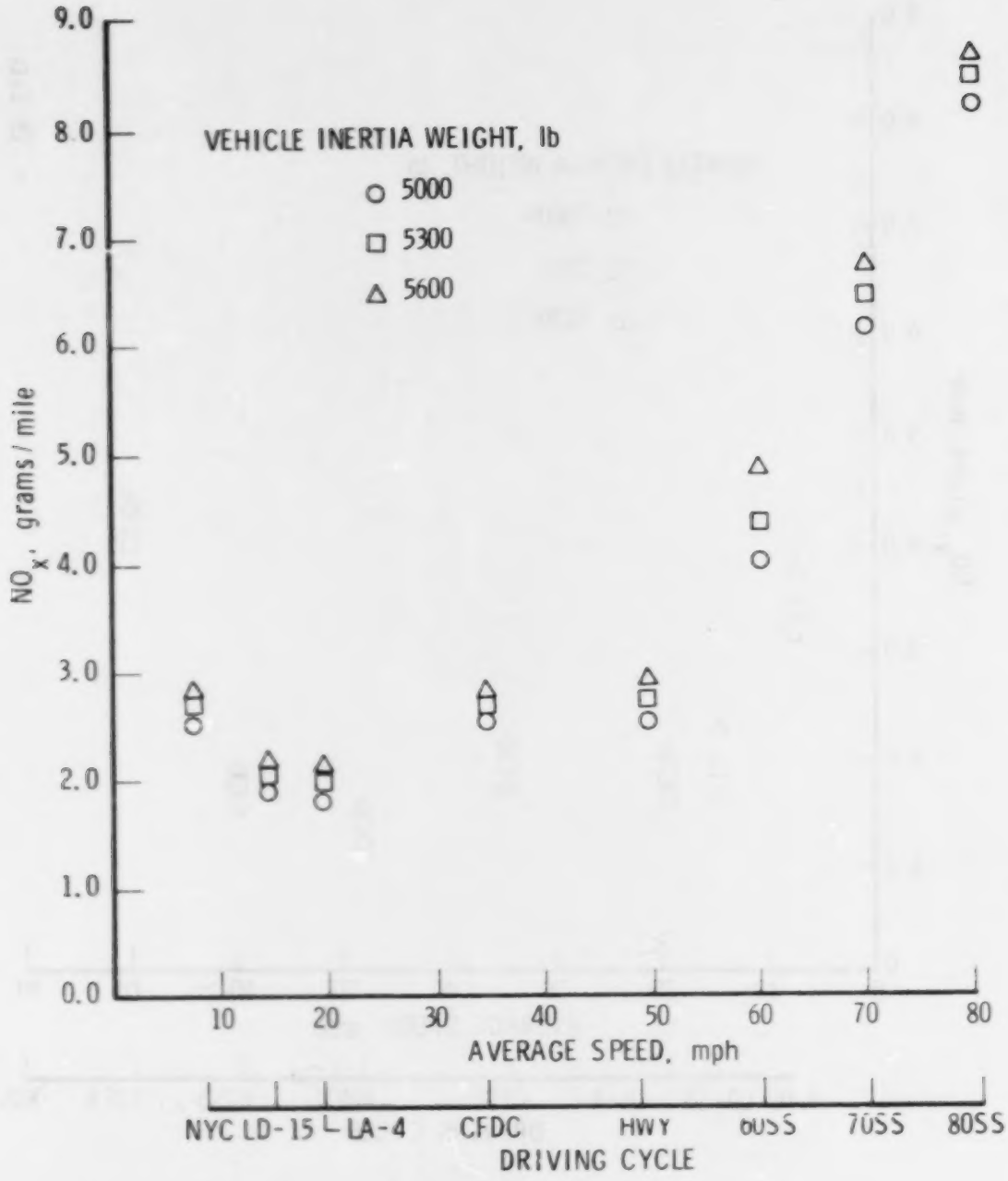

Figure 3-18. Chevrolet Weight Sensitivity Results for NO_x

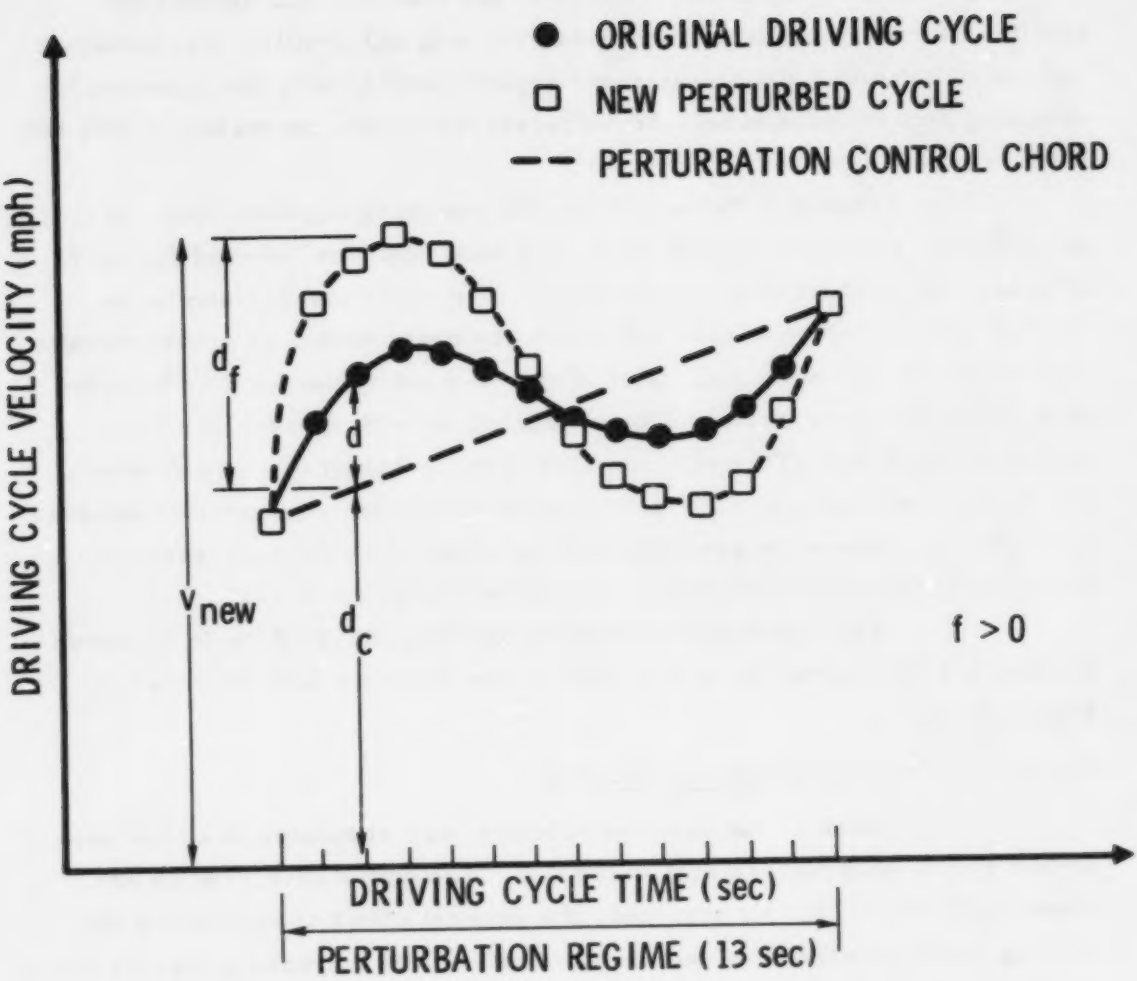

Figure 3-19. Driving Cycle Perturbation Method

At each time point the difference (d) between the driving cycle velocity and the control chord is computed. This difference is inflated by the perturbation factor (f) and added to the velocity determined by the control chord (d_c). Thus the new velocity is $d_c + df$, and, as illustrated, d can be positive or negative. A perturbation factor greater than 1.0 will accentuate the velocity profile; a factor less than 1.0 will smooth the profile; a factor equal to 1.0 will yield the original profile. Perturbation factors of 2.5 and 4.0 were selected experimentally with the objective of obtaining approximate acceleration/deceleration rate increases of 50% and 100%, respectively.

Shown in Table 3-8 are the resulting accelerations, decelerations, average cycle velocity, and total distance covered for each driving cycle perturbation combination. For ready comparison to the original driving cycle, Table 3-9 shows the perturbation summary results ratioed to the corresponding value of the original cycle. It may be noted that, using the same perturbation construction technique for the three cycles studied, the NYC cycle resulted in the greatest average accelerations and decelerations in the perturbed mode. The acceleration/deceleration rates for this cycle are increased by about 120% for a perturbation factor of 2.5 and about 250% for a perturbation factor of 4.0.

For illustrative purposes the original HWY cycle is shown in Figure 3-20 and the perturbed HWY cycle (factor = 4.0) is shown in Figure 3-21.

3.4.2 Simulations and Results

Each of the baseline vehicles was simulated over the perturbed cycles with factors of 2.5 and 4.0. The cumulative results are shown in Table 3-10. As expected, the general effect of increasing the driving cycle acceleration/deceleration rates is to increase emission rates and to decrease fuel economy. Three departures from this general trend may be noted for the NYC driving cycle at a perturbation factor of 4.0 relative to conditions at a perturbation factor of 2.5:

(1) The Honda fuel economy improves.

(2) The Honda HC emissions decrease.

(3) The Buick NO_x emissions decrease.

Table 3-8. Perturbed Driving Cycle Statistics

Driving Cycle	Perturbation Factor	Total Distance (Miles)	Average Velocity (MPH)	Average Acceleration (ft/sec^2)	Average Deceleration (ft/sec^2)
NYC	1.0	1.2	7.1	2.03	-1.99
	2.5	1.6	10.0	4.36	-4.34
	4.0	2.6	14.8	6.88	-6.96
HWY	1.0	10.2	48.2	0.65	-0.73
	2.5	10.2	48.3	0.96	-1.96
	4.0	10.5	48.4	1.41	-1.67
LA-4	1.0	7.5	19.6	1.66	-1.89
	2.5	8.1	21.0	2.53	-2.82
	4.0	9.0	22.9	3.89	-3.99

Table 3-9. Perturbed Driving Cycle Ratios

Driving Cycle	Peturbation factor	Distance	Average Velocity	Average Acceleration	Average Deceleration
NYC	1.0	1.0	1.0	1.0	1.0
	2.5	1.3	1.4	2.1	2.2
	4.0	2.1	2.1	3.4	3.5
HWY	1.0	1.0	1.0	1.0	1.0
	2.5	1.0	1.0	1.5	1.5
	4.0	1.0	1.0	2.2	2.5
LA-4	1.0	1.0	1.0	1.0	1.0
	2.5	1.1	1.1	1.5	1.5
	4.0	1.2	1.2	2.4	2.1

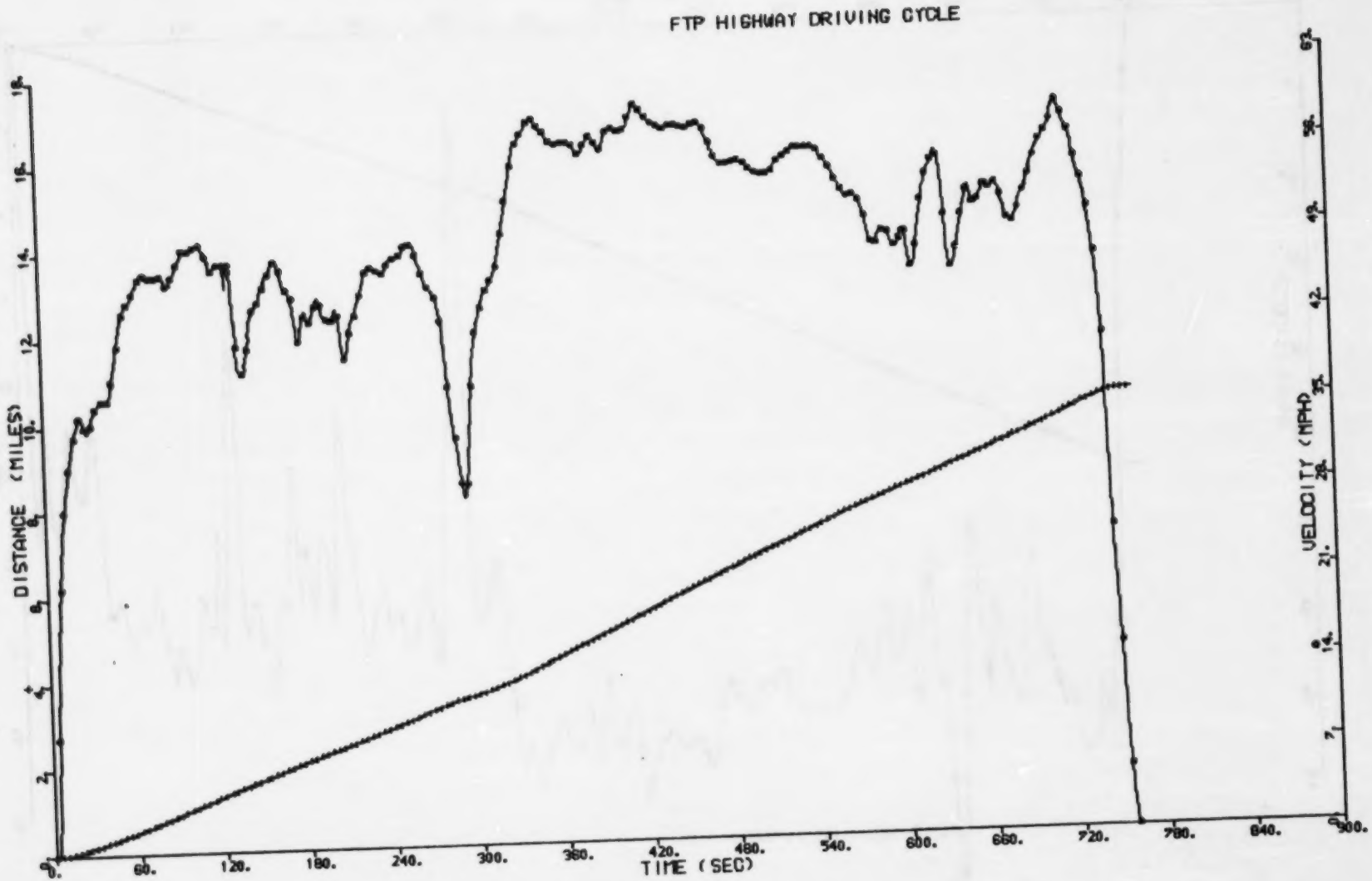

Figure 3-20. Baseline FTP Highway Driving Cycle

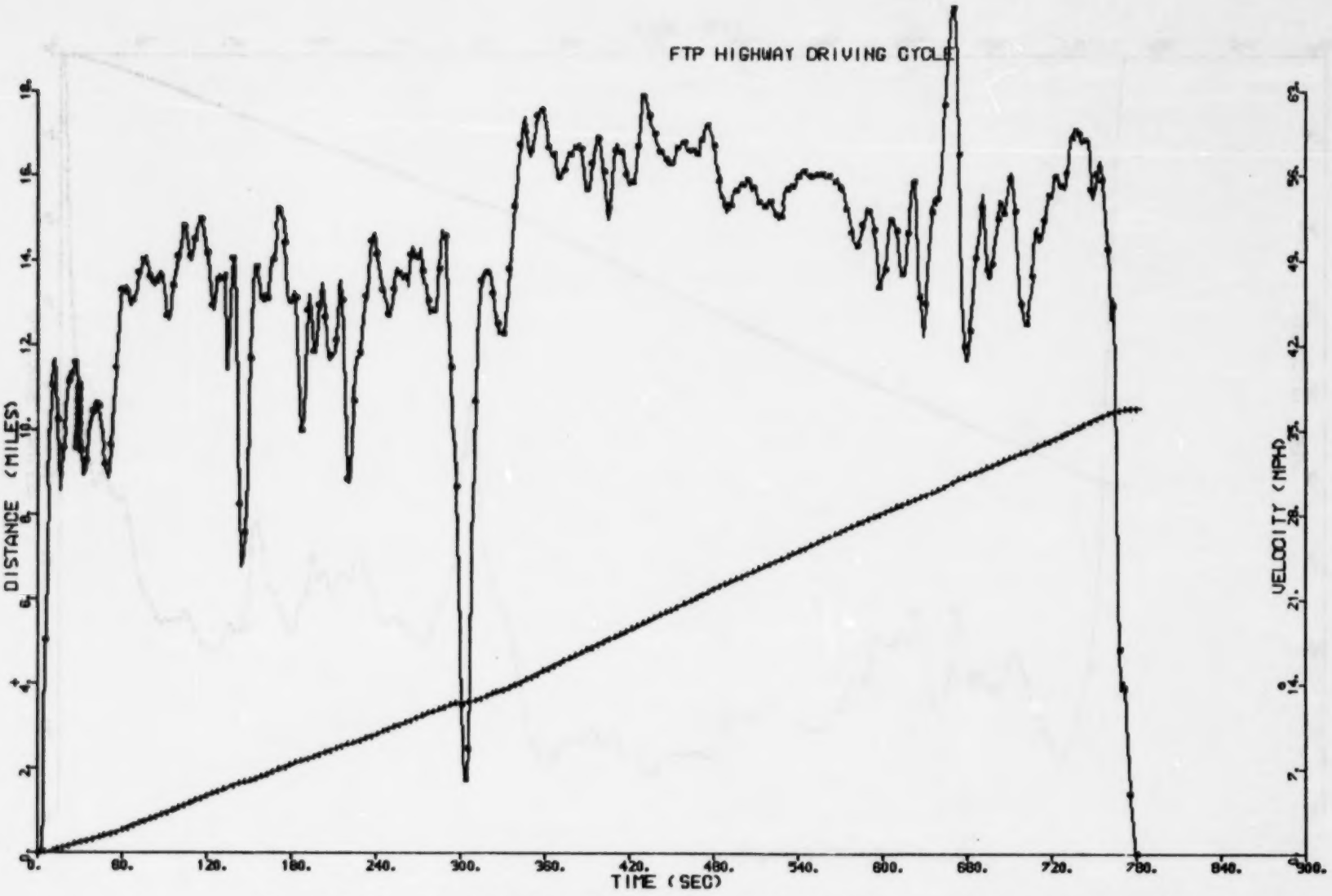

Figure 3-21. Perturbed FTP Highway Driving Cycle, Perturbation Factor = 4.0

Table 3-10. Driving Cycle Perturbation Results

Vehicle	Perturbation Factor	Driving Cycle	Fuel Economy	Emissions (G/Mile) HC	CO	NO_x
Chevrolet	1.0	LA-4	12.6	.20	.47	1.85
		HWY	17.2	.06	.50	2.54
		NYC	6.5	.56	2.67	2.54
	2.5	LA-4	10.69	.43	23.63	3.27
		HWY	16.04	.13	7.71	3.12
		NYC	5.22	1.82	132.98	4.54
	4.0	LA-4	8.36	1.16	96.22	4.06
		HWY	14.52	.28	21.89	3.38
		NYC	4.67	2.86	246.56	6.31
Buick	1.0	LA-4	18.3	.17	.06	1.69
		HWY	23.1	.07	.18	1.25
		NYC	9.5	.47	.11	3.19
	2.5	LA-4	14.91	.32	11.00	3.29
		HWY	21.53	.12	3.79	1.89
		NYC	7.58	1.18	63.70	5.12
	4.0	LA-4	11.78	.82	52.20	3.71
		HWY	19.47	.23	12.20	2.54
		NYC	7.02	1.86	136.50	4.90
Honda	1.0	LA-4	24.2	1.53	3.21	2.11
		HWY	31.1	.22	1.42	2.43
		NYC	13.5	3.93	9.82	3.11
	2.5	LA-4	22.21	2.24	17.57	3.24
		HWY	29.79	.51	6.93	2.81
		NYC	12.57	5.42	52.06	5.99
	4.0	LA-4	20.04	2.88	36.67	4.10
		HWY	27.90	.82	14.66	3.15
		NYC	14.11	3.58	64.49	6.54

Item (1) reflects a substantial improvement in performance at higher throttle settings indicated by the Honda fuel consumption map. Item (2) reflects an improvement in HC emission characteristics indicated by the Honda HC emission map at intermediate engine speed. Item (3) reflects Buick NO_x emission map characteristics at peak engine torque.

3.5 CONTROL LOGIC SENSITIVITY STUDY

3.5.1 Introduction

This study was performed to assess the emission effects of fuel economy optimization based on engine parameter control strategies (exhaust gas recirculation, spark advance, and air-to-fuel ratio) while constraining engine emissions. In prior studies (e.g., Ref. 5) mathematical representations of spark ignition engine fuel consumption and emission characteristics were successfully developed. These representations take the form of regression equations whereby fuel and emission rates are expressed as polynomial functions of engine speed, engine torque, percent of exhaust gas recirculation (%EGR), spark advance (^{o}A), and air-to-fuel ratio (A/F). The regression equations are based on steady state fuel and engine-out emissions data. Thus, for a given engine speed, engine load, %EGR, ^{o}A, and A/F, the equations yield the fuel rate (lbs/hr) and the emission rates (grams/hr) for HC, CO and NO_x.

At a single engine speed and torque setting the fuel rate and emission rates are governed entirely by %EGR, ^{o}A, and A/F. If emissions are constrained so as not to exceed specified levels for a given driving cycle, many %EGR, ^{o}A, A/F combinations may exist which satisfy this constraint, and at least one of these combinations will yield a minimal fuel rate. As engine speed and torque vary over the driving cycle, so will the control parameter values that influence fuel rate. Since the emission constraint is specified as a cycle-integrated requirement. the mpg-optimization process must be conducted over the aggregate of all driving cycle speed-torque points. These considerations form the basis for fuel economy optimization under emission constraints.

This study utilizes two control logics developed by DOT (Ref. 3) to optimize fuel economy for the combined EPA City-Highway Cycles while meeting emission constraints over only the City Cycle.

3.5.2 Simulation Cases and Results

Two sets of control logic data were provided by DOT via EPA. Each set consisted of optimized %EGR, ^{o}A, and A/F at 41 torque-speed points for a Chevrolet Nova vehicle with a 305 CID engine. One set represented optimum-mpg control parameter settings for meeting the 1978 Federal emission levels of 1.5, 15, 2.0 g/mi for HC, CO, NO_x, respectively, and the other set represented optimum-mpg control settings for meeting a reduced-NO_x emission set of 1.5, 15, 1.0 g/mi for HC, CO, NO_x. The engine/vehicle information is shown in Table 3-11.

As discussed in Section 3.5.1, the optimization analysis considered steady state engine-out emissions. An engineering factor and assumed catalyst efficiencies were applied to relate the tail pipe emission levels to those obtained at the engine level. The engineering factor chosen by DOT to account for driveability, cold start, and engine transients was 0.66 (Ref. 3). Overall catalyst throughput ratios (throughput ratio = 1-Cat. Eff.) of 0.3/0.4/1.0 were applied, respectively, for HC/CO/NO_x.

The control logic data are shown in Tables 3-12 and 3-13 for the 1.5/15.0/2.0; HC/CO/NO_x constraint and the 1.5/15.0/1.0; HC/CO/NO_x constraint, respectively.

The vehicle was simulated using VEHSIM over four driving cycles (LA-4, HWY, NYC, 70SS) using an engine map provided by DOT via EPA. The resulting speed and torque profile for each cycle was stored on magnetic tape.

A computer program (VSIMX) was written which would accept as inputs the speed and torque history from VEHSIM and tabular control logic data. For each speed and torque point, VSIMX interpolated a value of %EGR, ^{o}A, and A/F from the control logic data. The regression equations (Ref. 5) were then applied at each speed and torque point using the interpolated values to calculate fuel and emission rates. These calculated results were output in the VSIME format. Since the regression equations calculate raw engine out emission rates, catalyst throughput ratios were calculated for HC and CO, using standard VSIME runs based on before-catalyst and after-catalyst emission maps. The HC

Table 3-11. Chevrolet 305 Vehicle Data

Test Vehicle	1976 Nova
Inertia Weight	4000 lbs.
Frontal area	22.8 ft^2
Aerodynamic Drag	0.535
Tire Rolling Circumference	6.729 Ft
Rear Axle ratio	2.73:1
Wheel Inertia	0.90 lb-ft-sec^2
Drive Shaft Inertia	0.04 lb-ft-sec^2
Torque Converter	
a) pump inertia	0.116 lb-ft-sec^2
b) turbine inertia	0.032 lb-ft-sec^2
Engine Inertia	0.101 lb-ft-sec^2
Engine	305 CID
Drive Converter Data	CODY2
Coast Converter Data	COCY2
Shift Logic	TEST2
Fan Loss Accessory	LFAY2A
Gear Ratios	3.11/1.84/1.00

Table 3-12. Engine Settings for 1.5/15/2.0 $HC/CO/NO_x$ Level

SPEED (RPM)	TOROUE (FT-LBS)	EGR (%)	SPARK ADVANCE °BTDC	A/F
608	2	0	31	17
601	27	0	31	17
697	48	0	33	17.5
884	12	0	36	17
947	31	0	36	17
903	51	9.5	38	17.5
898	70	9.5	39	17.5
1127	17	0	40	17
1091	34	0	37	17
1064	56	6.5	40	17.5
1118	69	14	44	18
1140	84	20	45	18
1352	19	0	43	17
1268	37	0	43	17.5
1341	41	0	42	17.5
1257	73	13	46	18
1304	90	20	49	18
1482	92	18	52	18.5
1485	107	20	52	19.5
1768	53	0	49	17.5
1901	52	0	52	17.5
1919	86	20	31	20
2083	50	1.5	53	18
2085	91	16	60	19
1487	132	20	52	20
1697	150	20	41	20
1903	168	19	60	19
1583	20	0	47	17
1584	48	0	48	17.5
1684	24	0	49	17
1705	73	0	50	17.5
1715	89	0	51	18
1902	25	0	53	17
1895	108	0	54	18
2086	33	0	56	17
2097	67	0	57	17.5
2056	117	0	58	18.5
2214	90	0	59	18
1705	136	6	54	18.5
1902	124	0	55	18.5
2143	122	0	59	18.5

Table 3-13. Engine Settings for 1.5/15/1.0 $HC/CO/NO_x$ Level

SPEED (RPM)	TORQUE (FT-LBS)	EGR (%)	SPARK ADVANCE °BTDC	A/F
608	2	0	29	16.5
601	27	0	26	16.5
697	48	0	30	17
884	12	0	34	16.5
947	31	1	30	16
903	51	7	32	16.5
989	70	20	40	17.0
1127	17	1	29	15
1091	34	7.5	33	16
1064	56	17	40	16.5
1118	69	20	35	15
1140	84	20	38	19.5
1352	19	3.5	33	15
1268	37	7.5	36	16
1341	41	20	43	16
1257	73	20	33	14
1304	90	20	43	19.5
1482	92	20	41	19
1485	107	20	41	19.5
1768	53	11.5	51	18
1901	52	13	53	18
1919	86	20	47	19.5
2083	50	20	55	18
2085	91	20	53	20
1487	132	20	42	20
1697	150	20	41	20
1903	168	20	57	19
1583	20	0	47	17.0
1584	48	0	48	17.5
1684	24	0	49	17.0
1705	73	0	50	17.5
1715	89	0	51	18.0
1902	25	0	53	17.0
1895	108	0	54	18.0
2086	33	0	56	17.0
2097	67	0	57	17.5
2056	117	0	58	18.5
2214	90	0	59	18.0
1705	136	6	54	18.5
1902	124	0	55	18.5
2143	122	0	59	18.5

and CO throughput ratios are shown in Table 3-14 as calculated from the results of each driving cycle. The NO_x throughput ratio is assumed to be equal to 1.0.

The results of this analysis, using the 41 torque-speed points given in Section 3.5.2 are summarized in Table 3-15. The columns labelled "RAW" show the results of the VSIMX simulations using the raw engine-out emission data. The "CAT" columns indicate the emission levels over each driving cycle after correcting the "RAW" VSIMX results according to the catalyst throughput ratios shown in Table 3-14. Also shown for comparison are the base case fuel economy and emissions (with oxidation catalyst) obtained over each of the driving cycles using the baseline engine maps.

It will be noted that fuel economy improvements are indicated for all cycles, for each of the two control levels, with gains of 3 to 8% for the 1.0 g/mi NO_x control level and 5 to 13% for the 2.0 g/mi NO_x control level.

For the 1.0 g/mi (reduced NO_x) control level, the optimum mpg calibration does yield a reduction in NO_x emissions over the NYC and LA-4 cycles compared to the base case, but produces higher NO_x emissions over the HWY and 70SS cycles. For 2.0 g/mi NO_x control level, the optimum mpg calibration produces a NO_x reduction over the NYC cycle, but yields slightly higher NO_x emissions over the LA-4 cycle and significantly higher NO_x emissions over the other cycles. Neither the 1.0 nor 2.0 NO_x control level was achieved on any cycle. This may be attributable to the fact that DOT's optimum spark timing, air/fuel ratio and EGR rates were predicated on a 41-point representation of the engine map while the simulation performed in this study treated the map on a 220-point grid. This suggests that a more fine-grained representation of the engine map in determining the optimum control setting may result in closer agreement with the desired NO_x control level. The HC emission results are seen to be lower over the NYC and LA-4 cycles and higher than the base case over the HWY and 70SS cycles.

Table 3-14. Chevrolet 305 Catalyst Throughput

Engine Map	Driving Cycle	Emission Rates (G/miles) HC	CO	NO_x	Catalyst Throughput HC	CO
After Catalyst	LA-4	.75	.83	2.35	.172	.120
	HWY	.18	.61	2.77	.146	.167
	NYC	2.34	2.38	3.20	.159	.136
	70SS	.12	1.19	4.47	.103	.107
Before Catalyst	LA-4	4.37	6.89			
	HWY	1.23	3.66			
	NYC	14.73	17.49			
	70SS	1.16	11.12			

Table 3-15. Control Logic Sensitivity Results for Chevrolet 305

Control Logic	Driving Cycle	Fuel Economy (MPG)	Emission Rates (Grams/Mile) HC RAW	HC CAT	CO RAW	CO CAT	NO_x RAW	NO_x CAT
Base Case	LA-4	15.5	---	0.75	---	0.83	---	2.35
	HWY	20.0	---	0.18	---	0.61	---	2.77
	NYC	7.8	---	2.34	---	2.38	---	3.20
	70SS	16.55	---	0.12	---	1.19	---	4.47
1.0 NO_x	LA-4	16.0	3.29	0.564	8.79	1.059	---	1.75
	HWY	20.9	1.70	0.249	2.91	0.485	---	4.59
	NYC	8.4	6.50	1.033	18.18	2.474	---	1.66
	70SS	17.29	1.71	0.177	3.10	3.317	---	6.09
2.0 NO_x	LA-4	16.7	3.23	0.554	5.04	0.607	---	2.41
	HWY	21.0	1.46	0.214	2.76	0.460	---	5.03
	NYC	8.8	6.77	1.075	12.32	1.676	---	2.46
	70SS	17.32	1.73	0.179	3.04	0.325	---	6.88

In both control cases, the calculated HC emission level is well below the target level of 1.5 g/mi. The CO emissions are seen to be somewhat more divergent, with the 2.0 NO_x control case showing CO levels below the base case. In each case, however, CO levels are well below the target level of 15 g/mi.

In summary, the optimization results for the "city" driving cycles show improved fuel economy, a reduction in HC emissions, and a reduction in NO_x emissions with an exception in the case of the LA-4 cycle at the 2.0 g/mi NO_x control level. Mixed effects are noted for CO emissions. Results at higher speed driving conditions (HWY, 70SS), show improved fuel economy, higher HC and NO_x emissions, and mixed effects for CO emissions. It thus appears that the price of optimizing fuel economy for the Urban/Highway driving cycles is an increase in HC and NO_x emissions at higher speed non-LA-4 driving conditions.

SECTION 4

SPECIAL ANALYSES

4.1 INTRODUCTION

Current vehicle simulation procedures do not predict the effect of cold start, load/speed transients or ambient temperature effects on emissions and fuel economy. The primary purpose of the effort described in this section was to assemble, reduce, and store EPA-supplied transient and temperature effects data in a form suitable for ready retrieval and use in future emission sensitivity studies. Also, a set of catalyst conversion efficiency maps were developed using EPA supplied pollutant emissions data for three vehicles.

4.2 DATA REDUCTION AND PROCESSING

The following sections contain detailed descriptions of how the data were processed. The data analyzed were from four EPA studies:

(1) Service Dyno Study
(2) CO Hot Spot Study
(3) Bureau of Mines Study
(4) Vehicle Sensitivity Study

The data from these studies were extracted and tabulated, and were supplied to EPA on hard copy as well as magnetic tape.

4.2.1 Service Dyno Study

This study (Ref. 6) contained raw data from engine dynamometer tests on transient emissions from cold start to hot stabilized conditions. There were 63 data cases analyzed, with three types of tests:

- Tests 1 through 43 were cold start tests without a transmission
- Tests 44 through 50 were hot steady state tests without a transmission
- Tests 51 through 63 were cold start tests with a transmission

Each of these test types were grouped and analyzed separately. The data in each case were recorded on strip charts containing:

- Light HC (LHC) and heavy HC (HHC) traces
- NO_x, CO_2, CO traces
- Speed and torque traces
- Temperature traces

A data sheet was also included for each case.

The emission strip chart values were read in scale deflections only, and were entered on a data sheet similar to that shown in Figure 4-1. The normalized value for each pollutant was also calculated and tabulated, as well as fuel flow. The temperature traces contained 12 recorded temperatures, 9 of which were of interest in this study and were numbered as follows:

1 - Engine Oil
4 - Carburetor air
5 - Cell ambient
6 - Transmission fluid
8 - Outside ambient
9 - Radiator in
10 - Radiator out
11 - Engine in
12 - Engine out

These were recorded on a data sheet similar to that shown in Figure 4-2. Some cases were missing temperature traces, and were noted in the comments section along with any other comments on the data sheet. The information on the data sheets was transferred to a computer tape and formatted tables were printed as shown in Figures 4-1 and 4-2.

4.2.2 CO Hot Spot Study

Data sets for five different vehicles were generated from the CO Hot Spot report (Ref. 7). These data included HC, CO, and NO_x emissions on a grams per mile basis and fuel economy on a miles per gallon basis. Each test had seven data points on the LA-4 and NYC cycles at five different soak times. An example data printout is shown

ENGINE MAPPING DATA

COLD START WITHOUT TRANSMISSION

TEST NO.= 18 RPM= 2400 NOMINAL TORQUE= 30 WET BULB= 64.0 DRY BULB= 73.0 BAROMETER= 28.78
F FD= 17.70 F LD= 4.00 F HD= .20 F CO= 9.00 F CO2D= 98.50 F ND= 12.00

TIME (MIN)	FUEL FLWD (PPH)	MAN. VAC. (IN-HG)	TORQUE (FT-LB)	SUM HP-HR	F FUEL	LHC	F LHC	HHC	F HHC	CO	F CO	CO2	F CO2	NOX	F NOX
.25	26.8	18.20	31.0	.0593	1.5140	15.0	3.75	3.0	15.00	1.0	.11	7.5	.08	0.0	0.00
.50	26.4	18.10	37.0	.1293	1.4920	22.0	5.50	5.7	28.50	75.0	8.33	63.3	.64	1.0	.08
.75	25.0	18.40	32.0	.1900	1.4120	57.0	14.25	150.0	750.00	65.0	7.22	85.0	.86	3.3	.28
1.00	24.2	18.30	31.0	.2570	1.3670	344.0	86.01	14.5	72.50	67.5	7.50	83.9	.85	4.7	.39
1.25	23.0	18.20	31.0	.3270	1.2990	186.0	46.50	5.4	27.00	67.0	7.44	84.8	.86	4.7	.39
1.50	21.6	18.10	31.0	.3960	1.2200	44.0	11.00	4.0	20.00	66.5	7.39	85.7	.87	4.8	.40
1.75	20.9	18.10	31.0	.4590	1.1810	29.5	7.38	3.2	16.00	56.0	6.22	89.4	.91	4.9	.41
2.00	20.9	18.00	31.0	.5180	1.1410	22.5	5.63	2.8	14.00	41.0	4.56	94.8	.96	5.4	.45
2.25	20.9	17.90	31.0	.5830	1.1410	17.3	4.33	2.7	13.50	22.5	2.50	98.8	1.00	9.4	.78
2.50	20.9	17.80	31.0	.6530	1.1410	13.8	3.45	1.9	9.50	8.2	.91	99.8	1.01	11.7	.98
2.75	20.9	17.80	31.0	.7200	1.1410	10.3	2.58	1.4	7.00	5.9	.66	99.2	1.01	12.2	1.02
3.00	20.9	17.60	30.0	.7920	1.1410	7.3	1.83	1.1	5.50	2.7	.63	99.3	1.01	12.1	1.01
3.25	20.9	17.60	30.0	.8550	1.1410	6.3	1.58	1.1	5.50	6.0	.67	99.0	1.01	12.6	1.05
3.50	18.8	18.40	31.0	.9250	1.0620	5.5	1.38	1.1	5.50	6.6	.73	99.0	1.01	12.7	1.06
3.75	18.8	18.40	32.0	.9860	1.0620	5.7	1.43	1.1	5.50	7.1	.79	99.3	1.01	13.5	1.13
4.00	18.7	18.30	32.0	1.0470	1.0560	5.4	1.35	1.1	5.50	8.1	.90	99.0	1.01	14.4	1.20
4.25	18.6	18.20	33.0	1.1100	1.0510	5.6	1.40	1.1	5.50	10.7	1.19	99.0	1.01	12.2	1.02
4.50	18.6	18.20	34.0	1.1750	1.0510	5.6	1.40	1.1	5.50	10.8	1.20	99.0	1.01	11.8	.98
4.75	18.6	18.20	34.0	1.2400	1.0510	5.7	1.43	1.1	5.50	9.0	1.00	99.0	1.01	12.8	1.07
5.00	18.5	18.20	34.0	1.3040	1.0450	5.7	1.43	1.1	5.50	7.1	.79	99.0	1.01	12.6	1.06
5.25	18.5	18.20	32.0	1.4250	1.0340	5.2	1.30	1.1	5.50	7.0	.78	99.0	1.01	12.5	1.05
5.50	18.5	18.20	33.0	1.5520	1.0340	5.0	1.25	.9	4.50	6.9	.77	99.0	1.01	12.9	1.08
6.00	18.3	18.20	34.0	1.6810	1.0400	4.8	1.20	.8	4.00	7.0	.78	99.0	1.01	13.0	1.08
6.50	18.4	18.20	33.0	1.8070	1.0280	4.6	1.15	.7	3.50	7.0	.78	99.0	1.01	13.0	1.08
7.00	18.2	18.30	33.0	1.9330	1.0280	4.7	1.18	.6	3.00	7.2	.80	99.0	1.01	12.7	1.06
7.50	18.2	18.30	33.0	2.0582	1.0280	4.8	1.20	.6	3.00	7.1	.79	99.0	1.01	12.9	1.08
8.00	18.2	18.30	34.0	2.1880	1.0280	4.4	1.10	.6	3.00	7.5	.83	99.0	1.01	12.7	1.06
8.50	18.2	18.30	34.0	2.3210	1.0280	4.7	1.18	.6	3.00	7.9	.88	99.0	1.01	12.8	1.07
9.00	18.2	18.30	35.0	2.4350	1.0060	4.7	1.18	.7	3.50	7.6	.84	99.0	1.01	12.0	1.00
9.50	17.8	18.50	30.0	2.4350	1.0060	4.4	1.10	.8	4.00	7.4	.82	99.0	1.01	11.7	.98
10.00	17.8	18.50	30.0	2.6660	1.0110	4.7	1.18	.8	4.00	9.5	1.06	98.3	1.00	12.0	1.00
11.00	17.9	18.50	31.0	2.9000	1.0110	4.5	1.13	.8	4.00	9.0	1.00	99.0	1.01	12.0	1.00
12.00	17.9	18.50	30.0	3.1290	1.0060	4.6	1.15	.6	3.00	9.0	1.00	99.0	1.01	12.0	1.00
13.00	17.8	18.50	30.0	3.3570	1.0060	4.5	1.13	.7	3.50	9.0	1.00	99.0	1.01	12.0	1.00
14.00	17.8	18.50	30.0	3.5870	1.0060	4.5	1.13	.5	2.50	9.0	1.00	99.0	1.01	12.0	1.00
15.00	17.8	18.50	30.0	3.8140	1.0000	4.0	1.00	.5	2.50	9.0	1.00	98.5	1.00	12.0	1.00
16.00	17.7	18.50	30.0	4.0420	1.0060	4.0	1.00	.5	2.50	9.0	1.00	98.5	1.00	12.0	1.00
17.00	17.8	18.50	30.0												

Figure 4-1. Service Dyno Study Engine Mapping Data Sheet

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18.00	17.9	18.50	[illegible]	4.2710	.9940	4.0	1.03	.4	2.30	3.0	1.03	98.5	1.03	12.0	1.03
19.00	17.7	18.50	[illegible]	4.2448	1.0000	4.0	1.03	.4	2.30	3.0	1.03	98.5	1.03	12.0	1.03
20.00	17.7	18.50	[illegible]	4.2720	1.0000	4.0	1.00	.2	1.00	3.0	1.00	98.5	1.00	12.0	1.00
21.00	17.8	18.50	[illegible]	4.2560	1.0000	4.0	1.00	.1	.90	3.0	1.00	98.5	1.00	12.0	1.00
22.00	17.7	18.50	[illegible]	4.1880	1.0000	4.0	1.00	.1	.90	3.0	1.00	98.5	1.00	12.0	1.00
23.00	17.6	18.50	[illegible]	4.4210	.9945	4.0	1.00	.1	.90	3.0	1.00	98.5	1.00	12.0	1.00
24.00	17.6	18.50	[illegible]	4.4490	.9945	4.0	1.00	.1	.90	3.0	1.00	98.5	1.00	12.0	1.00
25.00	17.7	18.50	[illegible]	4.2720	1.0000	4.0	1.00	.1	.90	3.0	1.00	98.5	1.00	12.0	1.00
26.00	17.7	18.50	[illegible]	4.1560	1.0000	4.0	1.00	.1	.90	3.0	1.00	98.5	1.00	12.0	1.00
27.00	17.6	18.50	[illegible]	4.3350	.9945	4.0	1.00	.2	1.00	3.0	1.00	98.5	1.00	12.0	1.00
28.00	17.7	18.50	[illegible]	4.5430	1.0000	4.0	1.00	.2	1.00	3.0	1.00	98.5	1.00	12.0	1.00
29.00	17.7	18.50	[illegible]	4.7320	1.0000	4.0	1.00	.3	1.00	3.0	1.00	98.5	1.00	12.0	1.00
30.00	17.6	18.50	[illegible]	[illegible]	.9945	4.0	1.00	.3	1.00	3.0	1.00	98.5	1.00	12.0	1.00

Figure 4-1. Service Dyno Study Engine Mapping Data Sheet (continued)

ENGINE TEMPERATURE DATA (DEG F)
COLD START WITHOUT TRANSMISSION

TEST NO.= 1P

TRACE NO.	1	11	12	9	10	5	8	6	4
TIME (MIN)	ENGINE OIL	ENGINE IN	ENGINE OUT	RADIATOR IN	RADIATOR OUT	CELL AMBIENT	OUTSIDE AMBIENT	TRANS. FLUID	CARB. AIR
.25	70.4	70.1	66.0	68.4	67.6	67.9	96.3	0.0	67.7
.50	71.6	72.8	69.7	69.5	67.7	68.2	96.3	0.0	70.9
.75	72.7	74.0	70.4	70.2	68.0	68.3	95.4	0.0	73.6
1.00	73.3	72.2	74.2	72.3	68.4	68.6	96.3	0.0	76.0
1.25	74.3	80.1	77.0	75.6	68.9	69.0	96.6	0.0	79.3
1.50	83.2	88.9	79.2	78.0	69.5	69.3	96.6	0.0	84.0
1.75	84.5	106.1	88.1	83.2	69.1	69.4	95.8	0.0	87.4
2.00	81.4	119.4	98.4	90.7	70.1	70.2	97.0	0.0	91.4
2.25	95.0	123.3	92.7	97.1	70.9	70.1	96.7	0.0	95.4
2.50	100.9	131.0	96.0	107.0	72.3	70.4	96.4	0.0	100.2
2.75	104.3	138.6	99.9	114.7	73.7	70.8	96.3	0.0	104.9
3.00	112.8	149.2	106.2	126.8	75.3	71.3	96.6	0.0	108.9
3.25	117.9	154.6	111.6	131.7	79.3	71.6	96.6	0.0	113.7
3.50	122.6	158.3	116.4	138.1	85.5	72.0	96.6	0.0	117.0
3.75	125.9	166.2	118.9	159.0	91.0	72.4	96.6	0.0	119.5
4.00	131.2	170.2	124.4	165.6	101.0	73.1	96.6	0.0	122.1
4.25	138.8	174.2	131.3	171.4	114.6	73.3	96.6	0.0	124.9
4.50	143.3	176.7	134.3	177.6	135.6	73.8	96.5	0.0	125.2
4.75	150.8	178.9	136.4	180.2	145.8	74.1	95.2	0.0	121.5
5.00	154.0	179.9	137.8	190.2	150.3	74.7	96.7	0.0	119.0
5.50	164.9	185.7	141.7	194.4	165.4	75.6	95.8	0.0	115.0
6.00	172.0	191.4	145.3	202.4	178.6	76.5	95.6	0.0	112.7
6.50	181.4	193.7	148.1	203.2	183.4	77.7	95.5	0.0	112.3
7.00	189.3	195.3	150.2	203.6	185.8	78.5	95.3	0.0	113.8
7.50	194.3	194.5	151.5	203.6	187.5	79.8	95.0	0.0	115.6
8.00	200.8	197.7	152.7	203.6	188.3	80.7	94.6	0.0	116.0
8.50	206.1	198.4	154.2	203.6	188.9	81.2	94.6	0.0	117.2
9.00	211.3	198.7	155.7	203.6	189.3	81.9	94.6	0.0	119.4
9.50	215.9	199.0	156.8	203.9	189.6	82.9	94.6	0.0	118.8
10.00	218.2	199.8	157.5	204.2	189.8	83.7	94.2	0.0	121.4
11.00	225.3	200.1	156.5	204.7	190.5	84.1	94.9	0.0	122.4
12.00	229.3	200.8	159.1	4.0	191.3	85.3	94.5	0.0	122.3
13.00	231.2	200.5	158.0	204.7	192.1	87.0	94.3	0.0	122.0
14.00	234.1	201.0	161.5	205.3	192.6	87.9	94.1	0.0	122.7
15.00	235.8	201.8	163.1	205.4	193.4	87.5	93.7	0.0	124.0
16.00	237.5	201.5	163.9	205.8	194.3	87.5	94.1	0.0	125.0
17.00	239.8	201.5	164.3	205.4	194.3	88.2	93.7	0.0	123.9
18.00	240.2	201.6	164.9	205.0	194.3	89.6	93.7	0.0	125.0
19.00	240.6	201.9	165.0	204.7	194.5	88.4	93.6	0.0	125.0

Figure 4-2. Service Dyno Study Engine Temperature Data Sheet (°F)

20.00	241.3	202.2	155.9	205.9	194.1	88.6	93.2	0.0	125.4
21.00	240.6	202.5	155.7	206.1	194.5	88.6	93.6	0.0	125.5
22.00	241.0	202.9	156.4	204.7	195.1	88.9	93.9	0.0	125.1
23.00	241.9	202.9	156.4	205.0	195.0	89.7	94.3	0.0	124.9
24.00	242.3	202.5	156.1	205.8	194.4	89.7	93.6	0.0	125.1
25.00	242.6	202.1	155.0	206.1	194.8	89.7	93.9	0.0	125.1
26.00	242.2	202.9	156.0	206.1	194.3	89.3	93.8	0.0	125.5
27.00	242.4	202.5	156.4	206.1	194.8	89.3	93.5	0.0	125.2
28.00	242.9	202.5	156.4	206.1	194.9	89.3	93.8	0.0	125.5
29.00	242.9	203.9	157.0	206.1	195.5	89.5	94.1	0.0	126.2
30.00	242.9	203.9	157.5	206.5	195.3	90.0	94.1	0.0	126.6

TEST NO.= 1#

COMMENTS

.20 THROTTLE ADJUST
3.25 THROTTLE ADJUST
5.00 THROTTLE ADJUST
6.00 THROTTLE ADJUST
00.00 THE 2020 VALUE AT .75 MIN IS OFF-SCALE. THE VALUE IS AN ESTIMATE.
00.00 TRACE NO. 6 (TRANSMISSION FLUID) NOT APPLICABLE THIS CASE.

Figure 4-2. Service Dyno Study Engine Temperature Data Sheet (°F) (continued)

in Figure 4-3. A vehicle description was provided in the CO Hot Spot report, and this description was included on the initial page of each data set, for each vehicle.

4.2.3 Bureau of Mines Study

Data sets for two different engines were generated from the final report (Ref. 8) of the Bureau of Mines Study. These data included fuel consumption, mass emissions (with and without catalyst), and engine operating parameters at various set-points of engine speed, torque, spark timing, and percent EGR.

A sample data printout is shown in Figure 4-4.

4.2.4 Vehicle Sensitivity Study

The emission and fuel economy data from this study (Ref. 9) on the effects of different soak times was extracted and tabulated in a form suitable for further analysis. This involved data on 2 cycles, the LA4 and HFET. The study involved 5 vehicles at 10 different soak times.

A sample data printout is shown in Figure 4-5.

4.3 CATALYST EFFICIENCY MAPS

Three sets of catalyst conversion efficiency maps were developed using EPA-supplied pollutant emissions data for engine operation with and without catalyst equipment. The engine data analyzed were a 1976 Chevrolet 305 CID, a 1975 Chevrolet 139.6 CID, and a 1977 Ford 140 CID. The engine-out emissions from the engine with a catalyst was assumed to be equal to the emissions from the engine without the catalyst. The catalyst efficiency was calculated according to

$$\frac{\text{Emission Without Catalyst - Emission with Catalyst}}{\text{Emission Without Catalyst}}$$

and expressed as a decimal quantity. The catalyst throughput is one minus the efficiency. The data was computed at each point of the engine map and plotted as a function of torque and speed, indicating contours of constant calculated catalyst efficiency.

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EMISSIONS (G/MI)1970 CHEVROLET IMPALA

LA-4 CYCLE 12 HR SOAK TIME AT ROOM AMB.
TEST NUMBERS: 775864,775865,775866,

CYCLE MILES	TOTAL MILES	COM	HC	NOX	CO	MPG	GAL	TOTAL HC	TOTAL NOX	TOTAL CO	TOTAL GAL	TOT HC/ TOT DIST	TOT NOX/ TOT DIST	TOT CO/ TOT DIST	TOT MI/ TOT GAL
0.680	0.680		4.55	0.62	161.74	8.20	0.083	4.55	0.62	161.74	0.083	6.691	0.912	237.853	8.200
1.969	2.649		3.13	6.42	55.64	13.20	0.149	7.68	7.04	217.38	0.232	2.899	2.658	82.061	11.414
0.514	3.163		0.93	1.80	12.53	11.60	0.044	8.61	8.84	229.91	0.276	2.722	2.795	72.637	11.443
0.451	3.614		0.65	1.25	9.37	13.20	0.034	9.26	10.09	239.28	0.311	2.562	2.792	66.209	11.637
0.961	4.575		2.14	2.34	33.15	10.10	0.095	11.40	12.43	272.43	0.406	2.492	2.717	59.543	11.276
1.745	6.320		1.90	2.69	29.57	16.70	0.104	13.30	15.12	302.00	0.510	2.104	2.392	47.785	12.387
1.180	7.500		2.97	2.87	43.22	9.60	0.123	16.27	17.99	345.22	0.633	2.169	2.399	46.029	11.846

EMISSIONS (G/MI)1970 CHEVROLET IMPALA

LA-4 CYCLE HOT START
TEST NUMBERS: 775704,775705,775706,

CYCLE MILES	TOTAL MILES	COM	HC	NOX	CO	MPG	GAL	TOTAL HC	TOTAL NOX	TOTAL CO	TOTAL GAL	TOT HC/ TOT DIST	TOT NOX/ TOT DIST	TOT CO/ TOT DIST	TOT MI/ TOT GAL
0.680	0.680		1.50	1.42	20.51	12.40	0.055	1.50	1.42	20.51	0.055	2.206	2.088	30.162	12.400
1.969	2.649		2.63	6.42	28.78	14.60	0.135	4.13	7.84	49.29	0.190	1.559	2.960	18.607	13.964
0.514	3.163		0.81	1.60	10.80	13.80	0.037	4.94	9.44	60.09	0.227	1.562	2.985	18.998	13.937
0.451	3.614		0.62	1.17	9.69	15.30	0.029	5.56	10.61	69.78	0.256	1.533	2.936	19.308	14.034
0.961	4.575		2.26	2.38	37.61	9.70	0.099	7.82	12.99	107.39	0.355	1.709	2.839	23.473	12.869
1.745	6.320		2.04	2.94	36.49	15.40	0.113	9.86	15.93	143.88	0.469	1.560	2.521	22.766	13.481
1.180	7.500		3.14	3.09	46.69	9.20	0.128	13.00	19.02	190.57	0.597	1.733	2.536	25.409	12.561

COMMENTS
COM.WINTER UNLEADED
ANY DEFLECTION OVER 1000.00-POSSIBLE MORE DEFLECTIONS THAN SHOWN 1
BAG 3 AND 5 ARE COMBINED SAMPLES 2
RANGE 19 HC SHOULD BE 87.2 NOT 87.7 3
RANGE 19 SHOULD BE 98.2 NOT 98.7 4
*--DIFFERENT CYCLE DISTANCE 5

Figure 4-3. Sample Data Printout for CO Hot Spot Study

INFLUENCE OF EXHAUST GAS RECIRCULATION, CATALYST, AND ENGINE PARAMETERS ON EXHAUST EMISSIONS AT GIVEN RPM

TABLE	PCT PWR	SP TM	MEAS AF	CALC AFR	INTAKE A R	PWR OUT	EXH RCL	EXH TEMP	ABS M PRES	SPEC F CN	CO W/O CATYL	HC W/O CATYL	NOX W/O CATYL	CO W/ CATYL	HC W/ CATYL	NOX W/ CATYL
1	10	30	14.9	14.7	98.2	4.9	0.0	999.	9.0	1.33	47.56	6.03	2.88	6.56	2.29	2.28
1	10	30	16.3	16.5	116.1	4.9	0.0	1040.	10.4	1.43	16.17	4.37	3.40	3.93	1.47	2.87
1	10	30	17.9	18.0	129.3	4.9	0.0	1055.	11.7	1.45	19.58	9.69	1.99	4.11	2.63	2.08
1	10	30	19.8	19.8	156.5	4.9	0.0	1037.	13.2	1.60	29.69	49.63	1.43	4.80	7.78	1.67
1	10	20	14.4	14.7	104.0	4.9	0.0	1030.	8.5	1.45	38.27	3.91	2.41	3.61	1.16	2.01
1	10	20	15.8	16.1	121.8	4.9	0.0	1039.	10.6	1.56	15.46	2.32	2.35	3.89	0.85	2.45
1	10	20	17.2	17.6	135.0	4.9	0.0	1109.	10.9	1.62	13.34	5.17	1.38	4.52	2.11	1.38
1	10	20	19.2	19.0	165.4	4.9	0.0	1109.	13.5	1.74	31.45	25.93	0.89	5.40	5.34	1.27
1	10	10	14.1	14.5	121.5	4.9	0.0	1155.	10.2	1.74	62.76	2.94	2.53	3.77	0.96	2.06
1	10	10	15.8	16.1	120.2	4.9	0.0	1152.	11.4	1.64	13.61	1.22	2.25	4.34	0.47	2.38
1	10	10	17.5	17.4	161.2	4.9	0.0	1157.	12.8	1.86	16.00	3.29	1.74	4.98	0.86	1.49
1	10	10	18.9	19.0	196.6	4.9	0.0	1197.	15.2	2.10	28.77	17.41	1.20	3.32	1.74	0.63
1	10	30	15.1	14.7	121.1	4.9	10.1	1134.	11.2	1.62	23.19	7.42	1.49	3.75	2.25	1.49
1	10	30	16.3	16.3	120.6	4.9	5.4	1069.	11.6	1.50	17.80	6.73	1.87	3.63	2.37	1.87
1	10	30	17.4	17.5	140.6	4.9	7.3	1081.	13.0	1.64	26.85	26.04	3.03	4.34	5.47	3.46
1	10	30	19.6	19.3	172.3	4.9	6.2	1038.	14.7	1.78	39.01	78.62	1.58	5.46	15.10	1.85
1	10	20	15.3	14.8	122.0	4.9	7.2	1175.	11.7	1.62	19.11	4.24	1.32	4.23	1.41	1.13
1	10	20	16.0	16.0	139.5	4.9	9.8	1161.	13.0	1.76	23.10	8.18	1.29	4.46	2.40	1.29
1	10	20	17.3	17.1	148.5	4.9	5.4	1124.	13.1	1.74	25.76	31.00	1.37	5.15	6.19	1.60
1	10	20	18.6	18.6	165.4	4.9	4.2	1115.	14.0	1.80	31.48	38.17	1.14	5.40	6.87	1.14
1	10	10	14.9	14.8	134.2	4.9	4.5	1205.	11.8	1.82	15.99	1.18	2.07	4.03	0.49	1.65
1	10	10	16.2	16.0	165.7	4.9	9.7	1227.	14.6	2.06	23.06	9.26	1.54	5.30	3.08	1.79
1	10	10	17.4	17.4	187.7	4.9	7.2	1214.	16.6	2.18	29.17	19.82	2.31	7.21	4.17	2.89
1	10	10	19.0	18.9	205.4	4.9	3.3	1193.	16.2	2.18	39.07	32.21	1.10	3.56	3.22	0.71
1	10	30	14.3	14.0	125.6	4.9	20.2	1117.	13.2	1.78	79.95	35.74	1.17	4.15	6.32	1.17
1	10	30	15.6	15.6	170.1	4.9	23.0	1040.	16.9	2.20	55.41	137.83	3.16	5.93	22.22	3.29
1	10	30	17.4	17.9	163.3	4.9	12.8	1047.	15.2	1.90	39.67	95.09	1.13	5.19	15.86	1.63
1	10	20	14.5	14.5	146.9	4.9	17.0	1200.	14.5	2.04	41.71	34.16	1.36	5.11	6.61	1.36
1	10	20	14.8	15.0	157.2	4.9	18.4	1142.	15.7	2.14	78.25	51.41	1.46	6.83	10.14	1.10
1	10	20	17.0	17.1	161.9	4.9	11.1	1131.	14.7	1.92	33.33	41.27	1.25	5.62	6.98	1.50
1	10	20	18.7	18.7	183.3	4.9	9.2	1053.	15.9	1.98	49.04	101.42	1.26	6.33	18.53	1.26
1	10	10	14.7	14.6	201.1	4.9	21.3	1202.	19.0	2.77	182.60	84.68	1.87	25.88	18.83	1.41
1	10	10	16.2	16.5	203.1	4.9	14.3	1190.	17.9	2.53	53.80	60.40	1.72	6.49	7.93	1.88
1	10	10	18.2	18.5	207.6	4.9	6.8	1171.	18.4	2.30	44.17	32.58	1.11	6.59	8.06	1.20
1	25	30	14.4	14.6	133.9	12.4	0.0	1057.	11.0	0.75	24.90	2.76	5.58	1.76	0.60	4.79
1	25	30	16.0	15.3	145.5	12.4	0.0	1048.	12.0	0.74	6.95	1.84	5.03	2.02	0.46	4.76
1	25	30	17.5	18.1	166.6	12.4	0.0	1062.	13.3	0.77	8.84	2.28	2.35	2.13	0.55	2.15
1	25	30	19.7	20.0	199.7	12.4	0.0	1048.	15.5	0.82	13.74	14.70	1.28	2.63	2.04	1.40
1	25	20	14.6	14.7	139.6	12.4	0.0	1108.	10.7	0.78	18.35	1.97	3.62	1.84	0.52	3.02
1	25	20	16.2	16.0	152.6	12.4	0.0	1107.	12.8	0.76	7.18	1.21	3.30	1.89	0.34	3.11
1	25	20	17.3	17.5	173.0	12.4	0.0	1109.	13.9	0.81	8.81	1.54	3.25	2.40	0.12	3.14
1	25	20	19.4	19.3	207.9	12.4	0.0	1111.	16.1	0.86	13.64	8.62	1.21	2.71	2.30	1.53
1	25	10	14.5	14.5	160.7	12.4	0.0	1132.	12.9	0.90	46.53	1.79	3.28	1.99	0.39	2.73
1	25	10	15.9	16.0	172.0	12.4	0.0	1167.	14.1	0.87	10.14	0.96	3.23	1.94	0.40	2.98
1	25	10	16.7	17.2	193.2	12.4	0.0	1164.	15.1	0.92	8.49	0.81	2.87	2.42	0.25	2.69
1	25	10	19.1	18.8	236.4	12.4	0.0	1176.	18.1	1.00	14.29	6.02	1.16	2.91	1.53	1.74
1	25	30	14.3	14.6	131.6	12.4	5.8	1064.	12.4	0.74	24.32	2.49	2.11	1.73	0.56	1.79
1	25	30	16.2	16.1	153.9	12.4	6.3	1101.	13.3	0.79	8.61	2.31	2.41	2.21	0.56	2.36
1	25	30	17.3	18.0	178.4	12.4	6.4	1081.	14.8	0.83	12.00	6.93	1.31	2.40	1.58	1.42
1	25	30	19.8	20.0	208.0	12.4	5.8	1001.	17.7	0.85	16.16	32.52	0.76	2.71	6.78	1.02
1	25	20	14.6	14.3	154.8	12.4	5.2	1155.	13.2	0.86	13.25	1.55	1.91	1.92	0.43	1.53
1	25	20	16.0	16.0	157.1	12.4	4.7	1129.	13.7	0.79	7.86	1.26	2.04	2.07	0.29	1.85
1	25	20	17.6	17.3	183.1	12.4	4.5	1130.	15.6	0.86	11.42	2.72	2.37	2.67	0.62	2.53
1	25	20	19.0	19.0	214.7	12.4	3.8	1110.	17.6	0.91	15.33	13.36	0.92	2.64	2.77	1.18

Figure 4-4. Sample Data Printout for Bureau of Mines Study

SENSITIVITY DATA SWRI UDDS ONLY

1976 CHEVROLET IMPALA
10MIN SOAK TIME

MILE	TOT MILE	HC EMISSION, G/TEST: TEST 24	TEST 25	TEST -	AVG	TOT HC G	TOT HC/ TOT MI G/MI	CO EMISSION, G/TEST: TEST 24	TEST 25	TEST -	AVG	TOT CO G	TOT CO/ TOT MI G/MI	NOX EMISSION, G/TEST: TEST 24	TEST 25	TEST -	AVG	TOT NOX G	TOT NOX/ TOT MI G/MI
0.22	0.22	0.93	0.85	0.0	0.89	0.89	4.05	4.03	3.54	0.0	3.78	3.78	17.20	0.41	0.43	0.0	0.42	0.42	1.91
0.45	0.67	0.12	0.13	0.0	0.12	1.01	1.51	0.56	0.16	0.0	0.36	4.14	6.19	0.29	0.33	0.0	0.31	0.73	1.09
0.15	0.82	0.11	0.11	0.0	0.11	1.12	1.37	1.01	0.86	0.0	0.93	5.08	6.20	0.38	0.46	0.0	0.42	1.15	1.40
0.85	1.67	0.31	0.61	0.0	0.46	1.58	0.95	7.21	25.41	0.0	16.31	21.39	12.81	2.27	2.27	0.0	2.27	3.42	2.05
0.87	2.54	0.12	0.13	0.0	0.12	1.71	0.67	0.27	1.09	0.0	0.68	22.07	8.69	0.92	1.06	0.0	0.99	4.41	1.74
0.34	2.88	0.05	0.06	0.0	0.05	1.76	0.61	0.54	0.98	0.0	0.76	22.83	7.93	0.66	0.73	0.0	0.69	5.10	1.77
0.26	3.14	0.06	0.06	0.0	0.06	1.82	0.58	0.96	1.20	0.0	1.08	23.91	7.61	0.51	0.55	0.0	0.53	5.63	1.79
0.45	3.59	0.06	0.09	0.0	0.07	1.90	0.53	2.04	1.50	0.0	1.77	25.68	7.15	0.72	0.83	0.0	0.77	6.41	1.79

KM	TOTAL KM	MI	TOTAL MILE	FUEL CONSUMPTION L/100 KM: TEST 24	TEST 25	TEST -	AVG	FUEL ECON. FUEL L	TOT FUEL L	KM/L	MPG
0.35	0.35	0.22	0.22	26.95	28.82	0.0	27.88	0.0976	0.0976	3.59	8.43
0.72	1.07	0.45	0.67	14.37	13.42	0.0	13.89	0.1000	0.1976	5.41	12.73
0.24	1.31	0.15	0.82	32.61	35.27	0.0	33.94	0.0815	0.2791	4.69	11.04
1.37	2.68	0.85	1.67	16.40	19.05	0.0	17.72	0.2428	0.5219	5.13	12.08
1.40	4.08	0.87	2.54	10.66	11.72	0.0	11.19	0.1567	0.6786	6.01	14.14
0.55	4.63	0.34	2.88	19.90	19.64	0.0	19.77	0.1087	0.7873	5.88	13.83
0.42	5.05	0.26	3.14	21.40	22.03	0.0	21.71	0.0912	0.8785	5.75	13.52
0.73	5.78	0.45	3.59	17.31	19.46	0.0	18.38	0.1342	1.0127	5.71	13.42

Figure 4-5. Sample Data Printout for Vehicle Sensitivity Study

These catalyst efficiency contour plots are shown in Figures 4-6 and 4-7 for the Chevrolet 305, Figures 4-8 and 4-9 for the Chevrolet 139.6, and Figures 4-10 and 4-11 for the Ford 140.

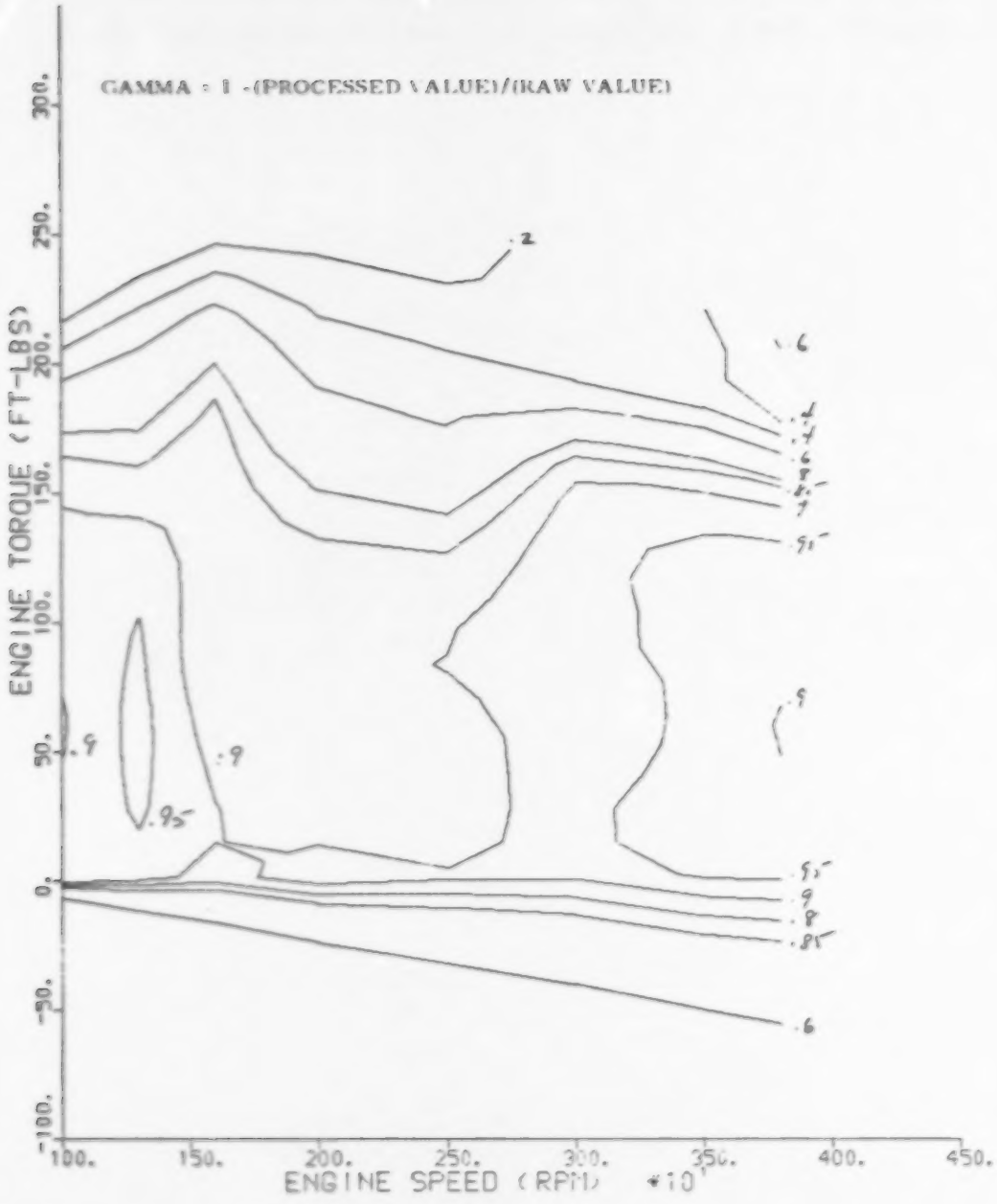

Figure 4-6. Catalytic Converter HC Efficiency Contour Plot for 1976 Chevrolet 305 CID Engine (Pellet Catalyst)

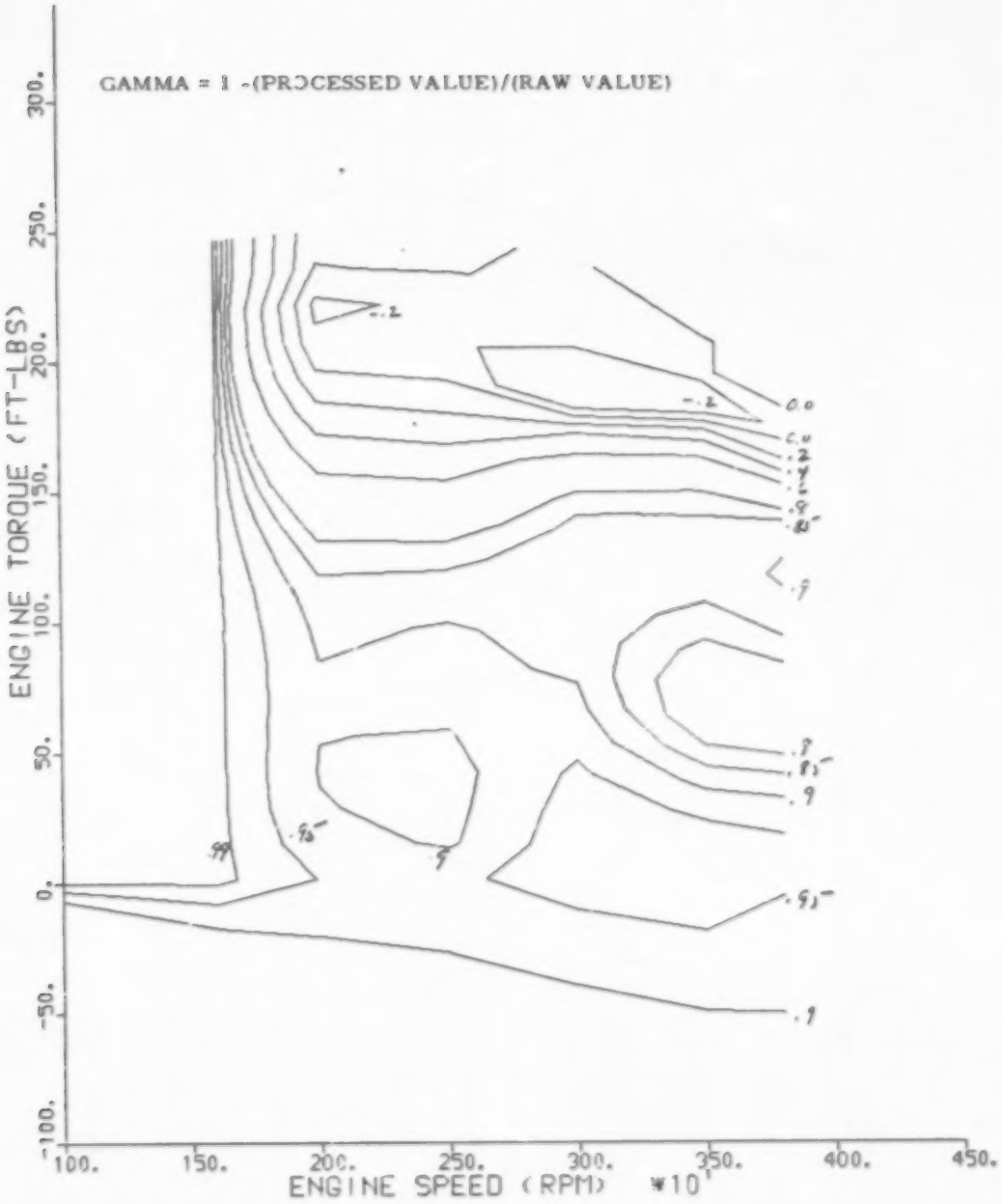

Figure 4-7. Catalytic Converter CO Efficiency Contour Plot for 1976 Chevrolet 305 CID Engine (Pellet Catalyst)

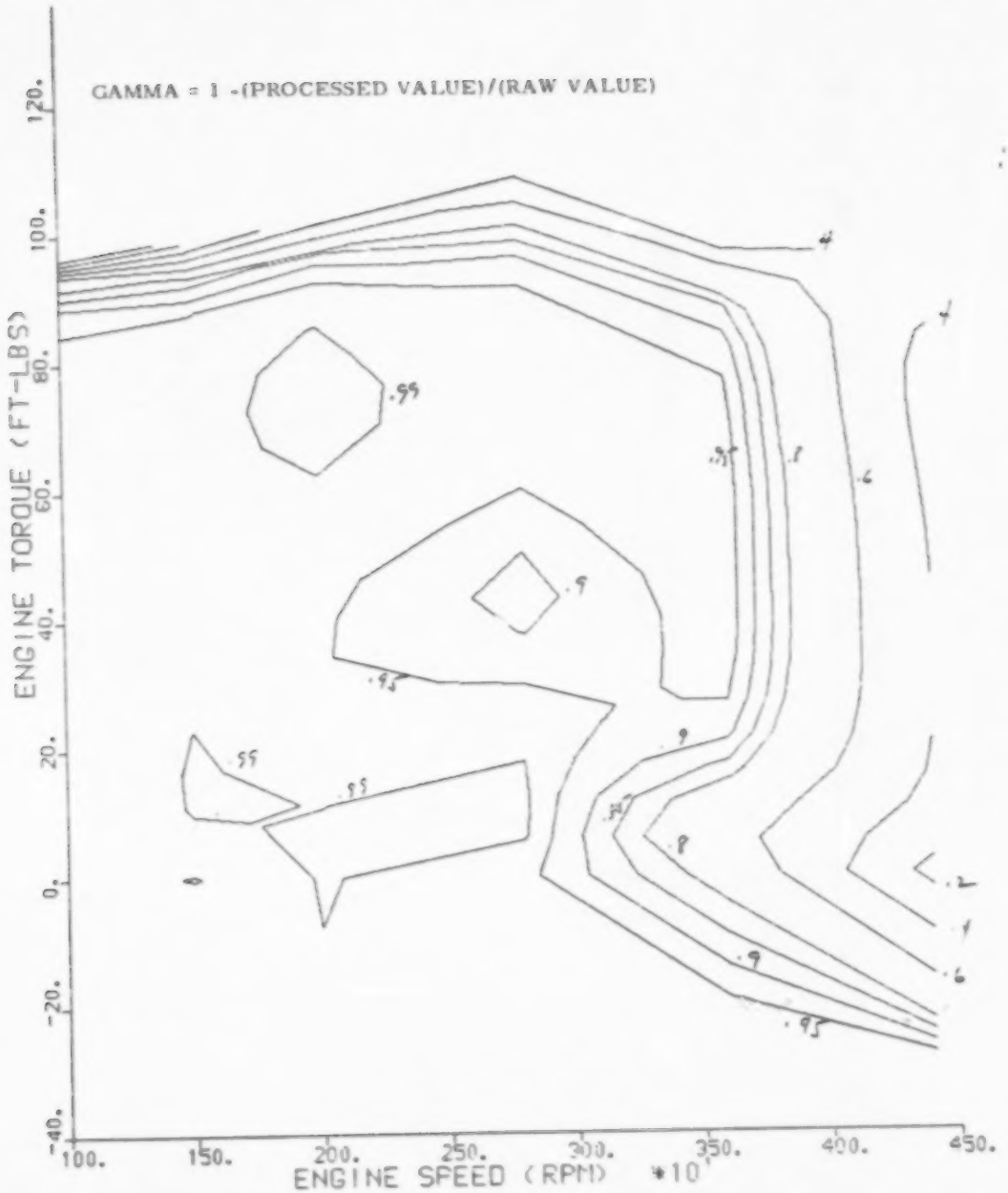

Figure 4-8. Catalytic Converter HC Efficiency Contour Plot for 1975 Chevrolet 139.6 CID Engine (Pellet Catalyst)

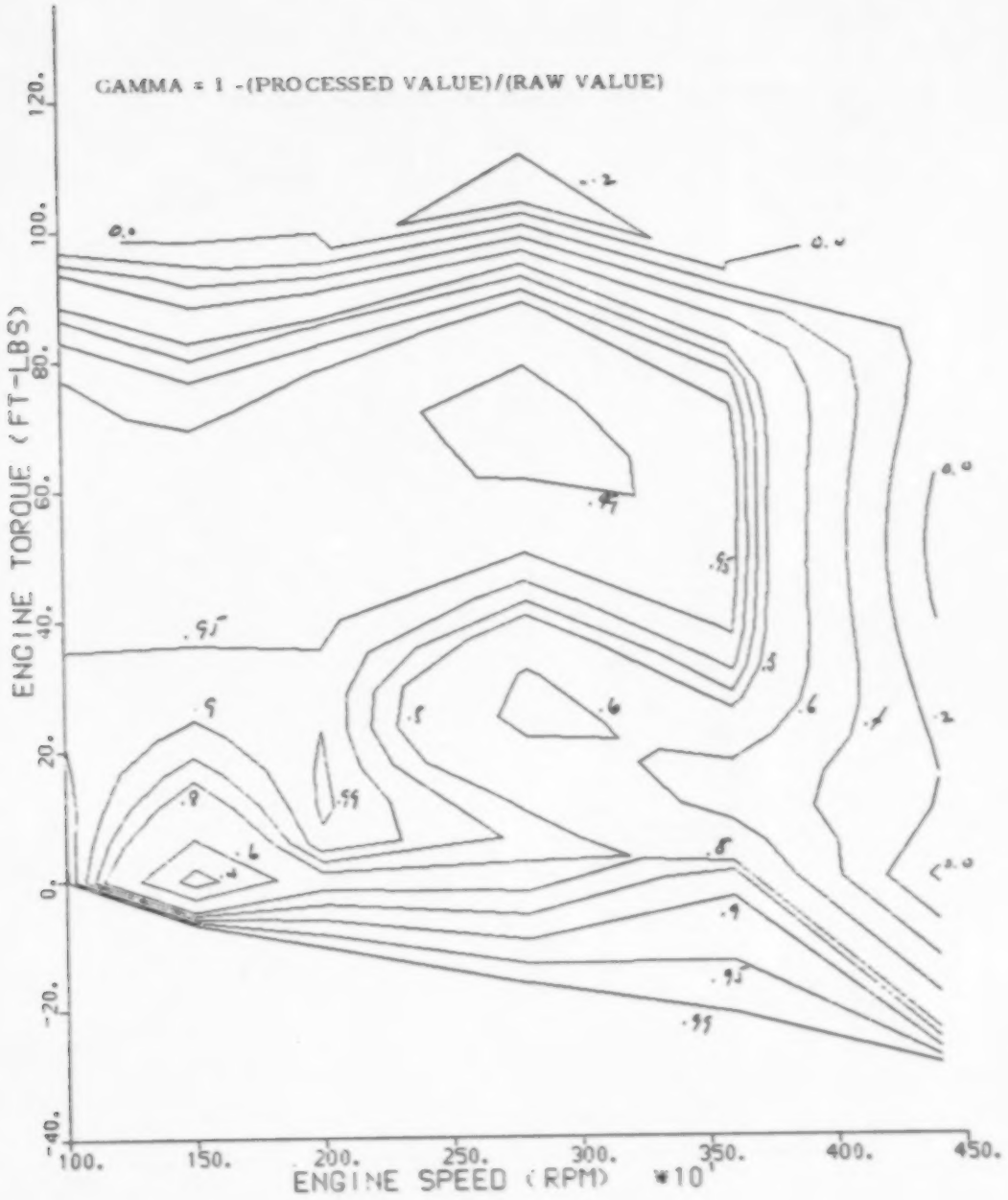

Figure 4-9. Catalytic Converter CO Efficiency Contour Plot for 1975 Chevrolet 139.6 CID Engine (Pellet Catalyst)

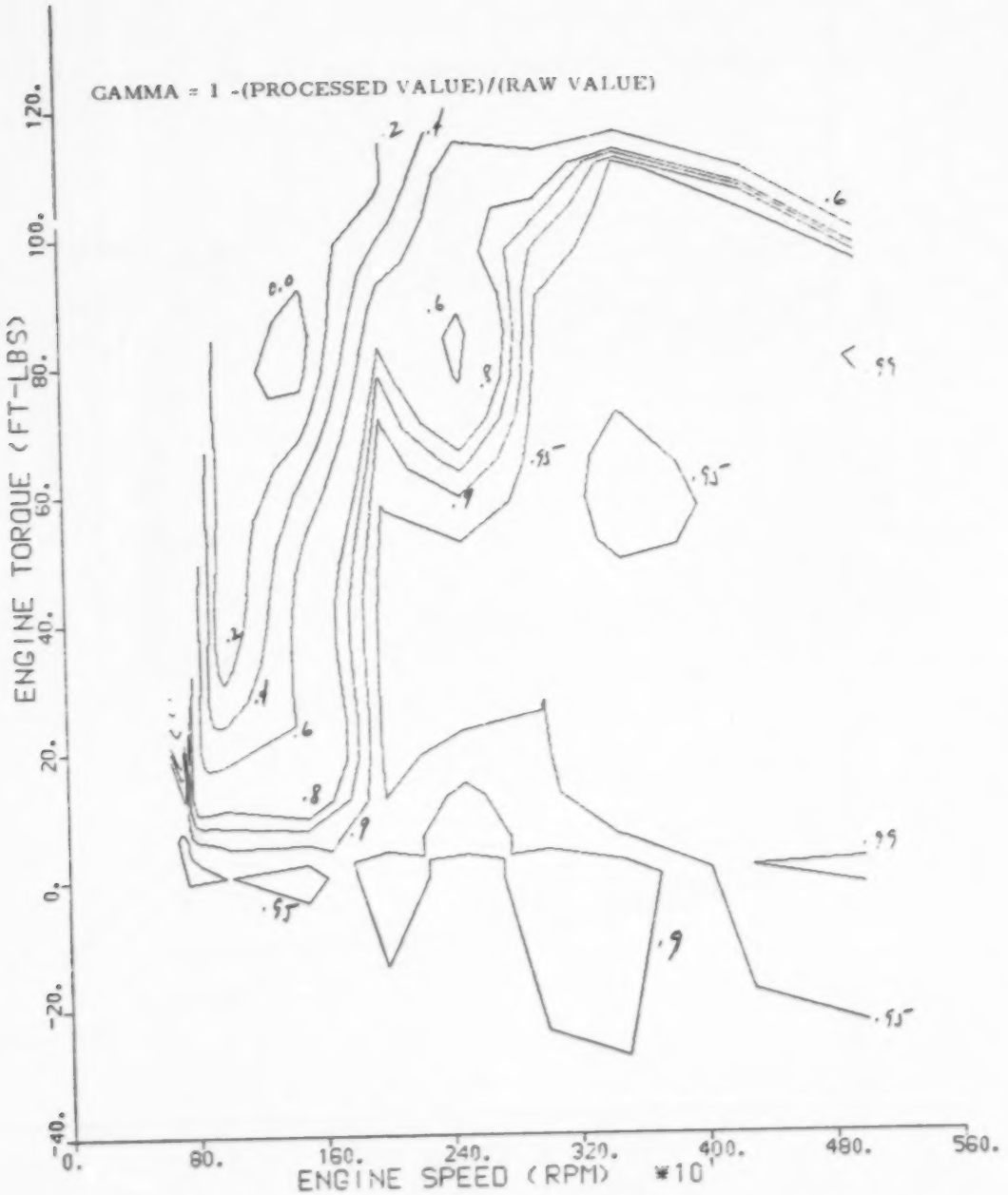

Figure 4-10. Catalytic Converter HC Efficiency Contour Plot for 1977 Ford 140 CID Engine (Monolith Catalyst)

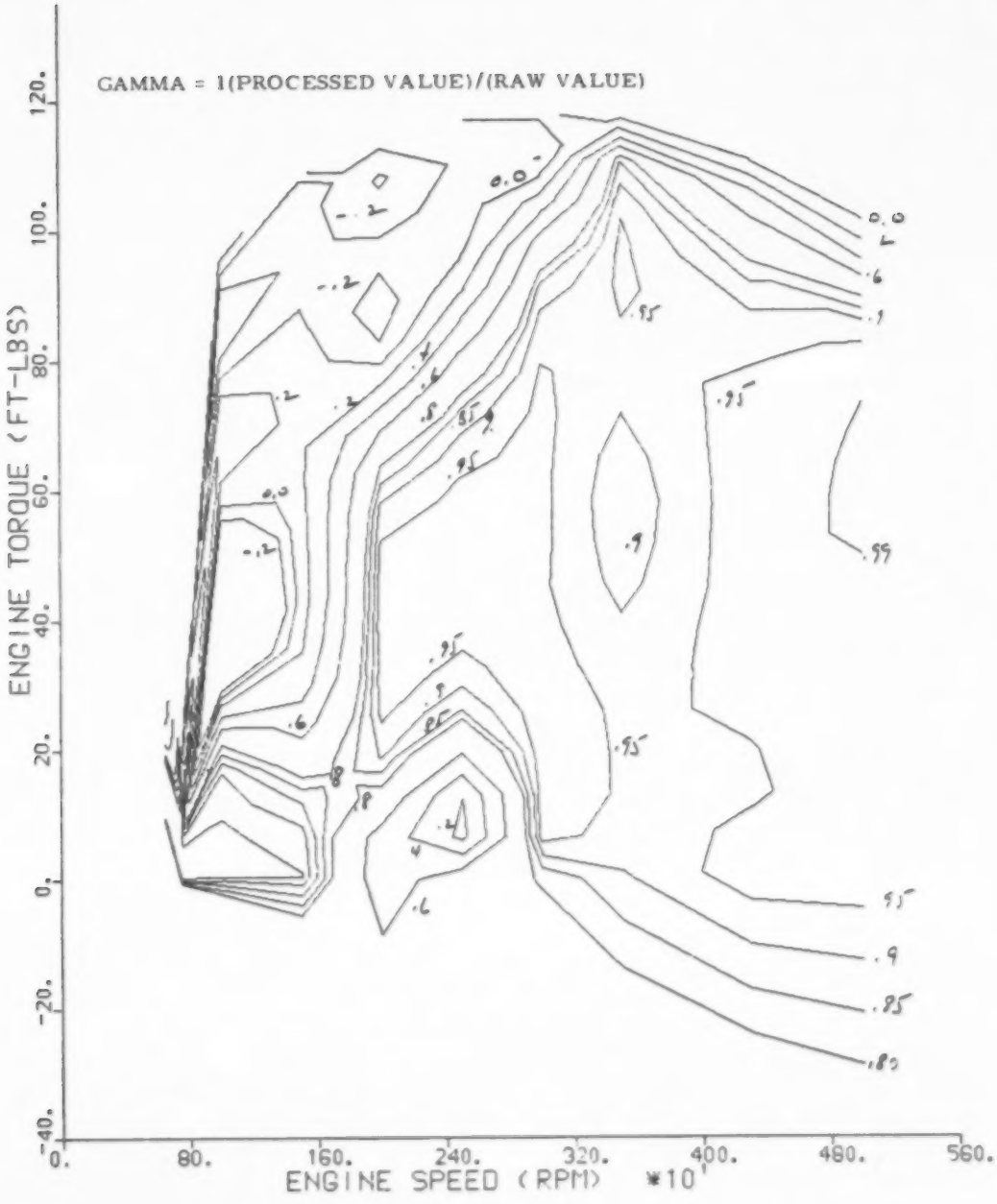

Figure 4-11. Catalytic Converter CO Efficiency Contour Plot for 1977 Ford 140 CID Engine (Monolith Catalyst)

REFERENCES

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APPENDIX A

SAMPLE VEHICLE SIMULATION PRINTOUT FOR BASELINE BUICK 231- LA-4 DRIVING CYCLE

APPENDIX A

VEHSIM PRINTOUT

```
          S C O P E   L O A D   M A P                    LOADER VERSION 1.0   10/23/78  10.12.05   PAGE   1

PROGRAM  WILL BE ENTERED AT  VEHSIM     ( 14545)          SCM LENGTH     126776          LCM LENGTH        0


          BLOCK          ADDRESS     LENGTH       FILE

           /GET/             100         53       VEHSIM
           /ENGMAP/          153       6341       VEHSIM
           /LDIMEN/         6514         21       VEHSIM
           /IO/             6535         34       VEHSIM
           /ENDOF/          6571          2       VEHSIM
           /OLDMAP/         6573       3151       VEHSIM
           /CONST/         11744        147       VEHSIM
           /CNTRL/         12113         10       VEHSIM
           /MOCON/         12123         22       VEHSIM
           /ACCESS/        12145       1536       VEHSIM
           /TORCON/        13703        321       VEHSIM
           /TMAP/          14224          4       VEHSIM
           /MISC/          14230         25       VEHSIM
           /V2MISC/        14255        116       VEHSIM
          VEHSIM           14373        266       VEHSIM
          ACCESR           14661         55       VEHSIM
           /CONSHFT/       14736          3       VEHSIM
           /RTE/           14741        476       VEHSIM
           /DSCHED/        15437      56727       VEHSIM
           /TRQRPM/        74366          6       VEHSIM
           /SHFTL/         74374       2226       VEHSIM
           /PRNLIM/        76622          6       VEHSIM
           /VEHICLE/       76630         62       VEHSIM
           /RUNID/         76712         14       VEHSIM
           /OUTP/          76726         11       VEHSIM
           /SEGNO/         76737          1       VEHSIM
           /FBRAKE/        76740          1       VEHSIM
           /CDEBUG/        76741         10       VEHSIM
          CONTROL          76751       4224       VEHSIM
          CONVTR          103175        201       VEHSIM
          DEBUG           103376        115       VEHSIM
           /DISK/         103513         25       VEHSIM
          DSK             103540        613       VEHSIM
          DSKRD           104353        615       VEHSIM
          DSKWR           105170        547       VEHSIM
          ENGINE          105737        620       VEHSIM
          GOBACK          106557        261       VEHSIM
           /CURVFT/       107040        315       VEHSIM
           /OLDIO/        107355          4       VEHSIM
          INPUT           107361       4134       VEHSIM
          MODSL           113515        151       VEHSIM
          PRNOUT          113666        472       VEHSIM
          PRNTPD          114360       2636       VEHSIM
          READFD          117216        305       VEHSIM
          REMAP           117523        265       VEHSIM
          SCALEN          120010        145       VEHSIM
          SHIFTS          120155        223       VEHSIM
          ZERO            120400         64       VEHSIM
           /STP.END/      120464          1    SL-FORTX
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SCOPE LOAD MAP LOADER VERSION 1.0 10/23/78 10.12.05 PAGE 2

/FCL.C./	120465	23	SL-FORTX
/GS.IO./	120510	136	SL-FORTX
GSNTRY=	120646	1	SL-FORTX
BACKSP=	120647	50	SL-FORTX
COMIO=	120717	60	SL-FORTX
DECODE=	120777	115	SL-FORTX
ENDFIL=	121114	45	SL-FORTX
EOF	121161	20	SL-FORTX
FECMSK=	121201	41	SL-FORTX
FLTIN=	121242	154	SL-FORTX
FLTOUT=	121416	315	SL-FORTX
FMTAP=	121733	372	SL-FORTX
FORSYS=	122325	561	SL-FORTX
FORUTL=	123106	16	SL-FORTX
GETFIT=	123124	43	SL-FORTX
INCOM=	123167	262	SL-FORTX
/IO.BUF./	123451	227	SL-FORTX
INPB=	123700	316	SL-FORTX
INPC=	124216	173	SL-FORTX
KODER=	124411	467	SL-FORTX
KRAKER=	125100	435	SL-FORTX
OUTB=	125535	207	SL-FORTX
OUTC=	125744	174	SL-FORTX
OUTCOM=	126140	204	SL-FORTX
REWIND=	126344	35	SL-FORTX
CLOCK=	126401	46	SL-FORTX
GOTOER=	126447	14	SL-FORTX
ATAN	126463	66	SL-FORTX
SINCOS=	126551	74	SL-FORTX
SQRT	126645	46	SL-FORTX
SYSAID=	126713	1	SL-FORTX
SYS=1ST	126714	62	SL-FORTX

```
VEHSIM CONTROL CARDS                    VERSION 1231     10/23/78
********************

 *USE  LEVEL        ROUTE
 *PRINT UNITS      ENGINE       RPM          TORQUE       LB/HR
 *LIMIT PRINT      SEGMENT
 *USE  T252Y2      GEAR                     1
 *USE  T152Y2      GEAR                     2
 *USE  T100Y2      GEAR                     3
 *USE  COCY2       CONVERTER
 *USE  CODY2       CONVERTER
 *USE  TEST2       SHIFT LOGIC
 *USE  LFANA       ACCESSORY
 *USE  B3500       VEHICLE
 *USE  F7DDC7      ENGINE          1        1 2 3
 *TITLE      FUEL RUN BUICK 231  WT=3500  8 DRIVING CYCLES  1ST=URBAN
 *USE  UDC001      DRIVING SCHEDULE
 *SIMULATE
 *TITLE      FUEL RUN BUICK 231  WT=3500  8 DRIVING CYCLES  2ND=HWY
 *USE  HDC002      DRIVING SCHEDULE
 *SIMULATE
 *TITLE      FUEL RUN BUICK 231  WT=3500  8 DRIVING CYCLES  3RD=CONG.FRWY
 *USE  EPACFC      DRIVING SCHEDULE
 *SIMULATE
 *TITLE      FUEL RUN BUICK 231  WT=3500  8 DRIVING CYCLES  4TH=15MPH
 *USE  LD-15       DRIVING SCHEDULE
 *SIMULATE
 *TITLE      FUEL RUN BUICK 231  WT=3500  8 DRIVING CYCLES  5TH=NYC-1
 *USE  NYC-1       DRIVING SCHEDULE
 *SIMULATE
 *TITLE      FUEL RUN BUICK 231  WT=3500  8 DRIVING CYCLES  6TH=60MPH
 *USE  SS60-3      DRIVING SCHEDULE
 *SIMULATE
 *TITLE      FUEL RUN BUICK 231  WT=3500  8 DRIVING CYCLES  7TH=70MPH
 *USE  SS70-3      DRIVING SCHEDULE
 *SIMULATE
 *TITLE      FUEL RUN BUICK 231  WT=3500  8 DRIVING CYCLES  8TH=80MPH
 *USE  SS80-3      DRIVING SCHEDULE
 *SIMULATE
```

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.HOT SEG	BRAKES
0.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 1	0.0
1.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 1	0.0
2.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 2	0.0
3.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 3	0.0
4.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 4	0.0
5.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 5	0.0
6.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 6	0.0
7.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 7	0.0
8.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 8	0.0
9.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 9	0.0
10.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 10	0.0
11.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 11	0.0
12.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 12	0.0
13.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 13	0.0
14.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 14	0.0
15.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 15	0.0
16.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 16	0.0
17.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 17	0.0
18.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 18	0.0
19.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 19	0.0
20.00	0.000	0.0	0.00	0.00	11.44	0.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 20	0.0
21.01	.000	3.0	4.40	2.77	.59	.1	1	.4	4.7	11.0	1000.	58.	14.2	.286	.467	34. 21	0.0
22.01	.002	5.9	4.25	4.78	.56	.4	1	.8	9.0	13.2	1000.	69.	11.9	.561	.787	40. 22	0.0
23.01	.004	8.6	3.96	5.60	.57	.9	1	1.1	12.4	16.1	1144.	74.	10.5	.715	.879	44. 23	0.0
24.01	.006	11.5	4.25	5.53	.55	1.4	1	1.6	17.7	22.4	1345.	87.	7.8	.814	.902	52. 24	0.0
25.01	.010	14.3	4.11	5.86	.53	1.9	1	2.1	21.5	27.6	1516.	96.	6.7	.897	.897	57. 25	0.0
26.01	.014	16.9	3.81	6.47	.52	2.4	1	2.6	23.9	29.8	1732.	90.	7.6	.928	.928	54. 26	0.0
26.75	.018	17.3	.59	19.87	.70	2.9	2	2.7	6.0	7.4	1074.	36.	17.5	.924	.924	23. 27	0.0
27.75	.023	18.1	1.17	14.54	.61	3.5	2	2.9	9.8	12.2	1160.	55.	14.1	.895	.895	34. 28	0.0
28.80	.028	20.7	3.81	7.14	.48	3.9	2	3.5	29.2	36.0	1549.	122.	3.9	.767	.895	70. 29	0.0
29.80	.034	21.7	1.47	12.59	.59	4.4	2	3.8	14.1	17.4	1367.	67.	11.4	.911	.911	42. 30	0.0
30.79	.040	22.4	1.03	15.51	.62	5.0	2	3.9	11.5	13.8	1377.	53.	13.9	.934	.934	35. 31	0.0
31.39	.044	22.5	.15	28.54	.72	5.3	3	4.0	5.1	6.5	1000.	34.	17.8	.850	.850	21. 32	0.0
32.39	.050	22.1	-.59	40.50	99.99	6.0	3	3.9	-.3	-.1	1000.	-1.	20.3	.835	.835	2. 33	0.0
33.39	.056	21.5	-.88	44.30	99.99	6.6	3	4.0	-1.0	-1.0	1000.	-5.	20.3	.812	.812	0. 34	18.8
34.39	.062	20.9	-.83	43.07	99.99	7.1	3	3.8	-1.0	-1.0	1000.	-5.	20.3	.789	.789	0. 35	19.5
35.39	.068	20.4	-.73	42.04	99.99	7.7	3	3.6	-1.0	-1.0	1000.	-5.	20.3	.770	.770	0. 36	5.0
36.39	.074	19.8	-.83	40.80	99.99	8.2	3	3.6	-.9	-1.0	1000.	-5.	20.3	.748	.748	0. 37	20.8
37.40	.079	17.0	-4.11	35.03	99.99	8.6	2	5.2	-1.2	-1.0	1000.	-5.	20.3	.976	.976	0. 38	342.0
38.40	.083	14.9	-3.08	30.70	99.99	9.0	2	3.9	-1.0	-1.0	1000.	-5.	20.3	.855	.855	0. 39	240.1
39.40	.087	14.9	0.00	23.03	1.26	9.3	2	2.2	2.2	3.1	1000.	16.	19.3	.855	.855	12. 40	0.0
40.40	.092	15.2	.44	20.18	.78	9.5	2	2.3	4.5	5.7	1000.	30.	18.2	.873	.873	19. 41	0.0
41.40	.096	15.5	.44	20.56	.78	9.7	2	2.3	4.6	5.8	1000.	30.	18.2	.890	.890	19. 42	0.0
42.41	.100	16.0	.73	18.27	.67	9.9	2	2.4	6.2	7.8	1018.	40.	17.1	.902	.902	25. 43	0.0
43.42	.105	17.1	1.61	12.04	.59	10.0	2	2.7	11.6	14.3	1179.	64.	12.5	.832	.903	39. 44	0.0
44.44	.110	19.1	2.93	8.15	.53	9.9	2	3.1	21.3	26.4	1404.	99.	6.2	.701	.895	58. 45	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
45.44	.116	21.1	2.93	8.38	.52	9.8	2	3.6	23.7	29.1	1484.	103.	5.7	.816	.902	60.	46	0.0
46.44	.122	22.7	2.35	9.66	.54	9.8	2	4.0	21.4	26.2	1485.	93.	7.1	.878	.903	55.	47	0.0
47.30	.127	22.9	.29	26.62	.67	10.1	3	4.1	6.2	7.6	1000.	40.	17.1	.865	.885	24.	48	0.0
48.31	.133	22.7	-.29	35.79	1.47	10.4	3	4.0	1.9	2.6	1000.	14.	19.5	.857	.857	10.	49	0.0
49.29	.140	22.6	-.15	33.52	1.05	10.8	3	4.0	2.9	3.8	1000.	20.	19.0	.854	.854	14.	50	0.0
50.28	.146	21.3	-1.91	43.89	99.99	11.1	3	4.9	-1.0	-1.0	1000.	-5.	20.3	.804	.804	0.	51	122.7
51.28	.151	19.0	-3.37	39.15	99.99	11.4	3	5.4	-.9	-1.0	1000.	-5.	20.3	.718	.718	0.	52	272.2
52.30	.156	17.1	-2.79	35.24	99.99	11.7	2	4.3	-1.2	-1.0	1000.	-5.	20.3	.982	.982	0.	53	208.7
53.30	.161	15.8	-1.91	32.56	99.99	11.9	2	3.4	-1.1	-1.0	1000.	-5.	20.3	.907	.907	0.	54	121.1
54.30	.165	15.8	0.00	24.36	1.24	12.1	2	2.4	2.4	3.1	1000.	16.	19.3	.907	.907	12.	55	0.0
55.37	.170	17.7	2.79	8.25	.55	11.9	2	2.8	18.9	23.4	1337.	92.	7.1	.760	.893	55.	56	0.0
56.37	.176	19.8	3.08	8.00	.52	11.7	2	3.3	23.1	28.5	1447.	103.	5.6	.785	.898	61.	57	0.0
57.37	.181	21.6	2.64	8.96	.53	11.6	2	3.7	22.3	27.3	1472.	97.	6.5	.842	.903	57.	58	0.0
58.36	.187	23.2	2.35	9.67	.53	11.5	2	4.2	21.9	27.0	1504.	94.	6.9	.885	.901	56.	59	0.0
59.34	.194	24.2	1.47	13.21	.56	11.6	3	4.4	16.0	19.4	1246.	82.	8.7	.734	.895	49.	60	0.0
60.34	.201	24.6	.59	21.75	.61	11.8	3	4.6	9.3	11.1	1096.	53.	14.8	.848	.904	32.	61	0.0
61.34	.208	24.9	.44	24.33	.63	12.0	3	4.6	8.2	9.7	1071.	48.	15.8	.878	.903	29.	62	0.0
62.31	.214	25.0	.15	30.07	.71	12.2	3	4.7	5.9	7.0	1029.	36.	17.6	.917	.917	22.	63	0.0
63.31	.221	24.6	-.59	43.66	27.69	12.5	3	4.6	-.2	.1	1000.	1.	20.3	.929	.929	3.	64	0.0
64.29	.228	24.5	-.15	35.92	1.01	12.8	3	4.5	3.3	4.1	1000.	21.	18.9	.925	.925	14.	65	0.0
65.30	.235	24.7	.29	26.85	.66	13.0	3	4.6	6.9	8.4	1037.	42.	16.8	.899	.899	26.	66	0.0
66.27	.241	24.8	.15	30.08	.71	13.2	3	4.6	5.8	6.9	1023.	36.	17.6	.916	.916	22.	67	0.0
67.25	.248	24.7	-.15	36.16	1.00	13.4	3	4.6	3.4	4.1	1000.	21.	18.9	.933	.933	14.	68	0.0
68.23	.255	24.6	-.15	36.04	1.00	13.6	3	4.6	3.4	4.1	1000.	21.	18.9	.929	.929	14.	69	0.0
69.23	.262	24.6	0.00	33.33	.82	13.8	3	4.6	4.6	5.4	1000.	28.	18.3	.929	.929	18.	70	0.0
70.26	.269	25.1	.73	19.66	.60	13.9	3	4.7	10.6	12.7	1138.	59.	13.6	.833	.903	36.	71	0.0
71.26	.276	25.6	.73	19.57	.60	14.0	3	4.9	10.9	13.1	1151.	60.	13.4	.840	.903	36.	72	0.0
72.24	.283	25.7	.15	29.98	.70	14.2	3	4.9	6.1	7.3	1054.	36.	17.5	.921	.921	23.	73	0.0
73.24	.290	25.4	-.44	40.64	2.39	14.5	3	4.8	1.2	1.6	1000.	8.	20.0	.959	.959	7.	74	0.0
74.25	.297	24.9	-.73	50.96	99.99	14.7	3	4.8	-1.1	-.9	1000.	-5.	20.3	.940	.940	0.	75	0.0
75.32	.304	25.0	.15	30.07	.71	14.9	3	4.7	5.9	7.0	1029.	36.	17.6	.917	.917	22.	76	0.0
76.33	.311	25.4	.59	21.60	.61	15.0	3	4.8	9.7	11.6	1118.	54.	14.5	.858	.904	33.	77	0.0
77.33	.319	26.0	.88	17.84	.59	15.1	3	5.0	12.4	14.7	1192.	65.	12.2	.824	.903	40.	78	0.0
78.33	.326	26.0	0.00	33.40	.79	15.2	3	5.0	5.0	5.9	1047.	29.	18.2	.937	.937	19.	79	0.0
79.33	.333	25.7	-.44	41.11	2.40	15.4	3	4.9	1.2	1.6	1000.	8.	20.0	.970	.970	7.	80	0.0
80.38	.341	26.1	.59	21.45	.61	15.5	3	5.0	10.0	12.0	1137.	55.	14.2	.867	.904	34.	81	0.0
81.38	.348	26.7	.88	17.75	.59	15.6	3	5.2	12.8	15.2	1210.	66.	11.9	.833	.903	40.	82	0.0
82.38	.355	27.5	1.17	15.05	.57	15.6	3	5.5	15.9	19.0	1285.	78.	9.5	.803	.901	47.	83	0.0
83.49	.364	28.6	1.61	12.39	.56	15.5	2	5.8	20.8	24.8	1742.	75.	9.6	.942	.942	47.	84	0.0
84.41	.371	29.3	1.03	15.98	.58	15.5	3	6.1	15.9	18.9	1309.	76.	9.8	.846	.904	46.	85	0.0
85.41	.380	29.8	.73	18.69	.60	15.5	3	6.2	13.3	16.0	1268.	66.	11.7	.885	.900	41.	86	0.0
86.41	.388	30.1	.44	23.00	.62	15.7	3	6.4	10.7	12.6	1244.	53.	14.2	.914	.914	34.	87	0.0
87.41	.396	30.4	.44	22.94	.62	15.8	3	6.5	10.8	12.8	1255.	53.	14.2	.915	.915	34.	88	0.0
88.41	.405	30.7	.44	22.86	.62	15.9	3	6.6	11.0	12.9	1265.	54.	14.1	.917	.917	34.	89	0.0
89.41	.413	30.7	0.00	32.58	.73	16.0	3	6.6	6.6	7.7	1223.	33.	17.8	.948	.948	23.	90	0.0
90.42	.422	30.5	-.29	39.50	1.07	16.2	3	6.5	3.6	4.3	1187.	19.	19.4	.970	.970	15.	91	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.HOT	SEG	BRAKES
91.40	.430	30.4	-.15	36.49	.85	16.4	3	6.5	5.0	5.8	1197.	26.	18.7	.959	.959	19.	92	0.0
92.38	.439	30.3	-.15	36.51	.85	16.6	3	6.4	5.0	5.8	1193.	26.	18.7	.959	.959	19.	93	0.0
93.36	.447	30.4	.15	28.96	.67	16.7	3	6.5	7.9	9.3	1225.	40.	16.7	.937	.937	27.	94	0.0
94.35	.455	30.8	.59	20.24	.61	16.8	3	6.6	12.5	15.0	1285.	61.	12.6	.905	.905	38.	95	0.0
95.35	.464	30.4	-.59	42.79	4.04	16.9	3	6.5	.6	1.1	1183.	5.	20.5	.970	.970	8.	96	0.0
96.35	.472	29.9	-.73	56.58	99.99	17.2	3	6.4	-.7	-.4	1030.	-2.	20.3	1.129	.886	2.	97	0.0
97.34	.480	29.5	-.59	43.27	4.74	17.3	3	6.1	.5	.9	1148.	4.	20.5	.970	.970	7.	98	0.0
98.44	.489	29.8	.44	23.08	.62	17.4	3	6.2	10.5	12.4	1234.	53.	14.3	.912	.912	34.	99	0.0
99.45	.498	30.3	.73	18.55	.60	17.4	3	6.4	13.6	16.4	1282.	67.	11.5	.892	.897	42.	100	0.0
100.44	.506	30.7	.59	20.26	.61	17.5	3	6.6	12.5	14.9	1281.	61.	12.6	.905	.905	38.	101	0.0
101.45	.515	30.9	.29	25.63	.64	17.6	3	6.7	9.6	11.3	1259.	47.	15.4	.927	.927	31.	102	0.0
102.43	.523	31.0	.15	28.82	.67	17.7	3	6.7	8.2	9.6	1246.	40.	16.6	.940	.940	27.	103	0.0
103.41	.532	30.9	-.15	36.36	.84	17.8	3	6.7	5.1	6.0	1216.	26.	18.7	.960	.960	19.	104	0.0
104.41	.540	30.4	-.73	57.06	99.99	18.0	3	6.5	-.7	-.3	1000.	-2.	20.3	1.148	.871	2.	105	0.0
105.41	.549	29.8	-.88	61.41	99.99	18.2	3	6.5	-1.4	-1.0	1000.	-5.	20.3	1.125	.889	0.	106	7.3
106.49	.557	29.9	.15	29.08	.68	18.3	3	6.3	7.7	9.1	1207.	40.	16.8	.935	.935	26.	107	0.0
107.49	.566	30.2	.44	22.98	.62	18.4	3	6.4	10.7	12.7	1248.	53.	14.2	.914	.914	34.	108	0.0
108.49	.574	30.7	.73	18.44	.59	18.4	3	6.6	13.9	16.7	1295.	68.	11.3	.896	.896	42.	109	0.0
109.50	.583	31.2	.73	18.41	.59	18.4	3	6.8	14.2	17.1	1312.	68.	11.2	.898	.898	42.	110	0.0
110.50	.592	31.8	.88	17.12	.58	18.4	3	7.0	16.1	19.2	1352.	75.	10.0	.889	.899	46.	111	0.0
111.49	.601	32.2	.59	20.08	.60	18.4	3	7.2	13.3	15.9	1334.	62.	12.2	.912	.912	39.	112	0.0
112.50	.610	32.4	.29	25.19	.64	18.5	3	7.2	10.3	12.1	1313.	48.	15.0	.932	.932	32.	113	0.0
113.52	.619	32.2	-.29	39.22	1.01	18.6	3	7.2	4.1	4.9	1253.	20.	19.4	.970	.970	17.	114	0.0
114.52	.628	31.7	-.73	58.25	99.99	18.8	3	7.0	-.5	-.2	1000.	-1.	20.3	1.197	.835	2.	115	0.0
115.52	.636	28.6	-4.55	58.94	99.99	19.0	3	10.5	-1.3	-1.0	1000.	-5.	20.3	1.080	.926	0.	116	378.3
116.52	.643	25.3	-4.84	52.14	99.99	19.1	3	9.3	-1.2	-1.0	1000.	-5.	20.3	.955	.955	0.	117	412.3
117.52	.650	22.0	-4.84	45.33	99.99	19.2	3	7.8	-1.0	-1.0	1000.	-5.	20.3	.831	.831	0.	118	416.6
118.52	.656	18.7	-4.84	38.53	99.99	19.3	3	6.4	-.9	-1.0	1000.	-5.	20.3	.706	.706	0.	119	420.4
119.53	.660	15.4	-4.84	31.73	99.99	19.4	2	5.2	-1.1	-1.0	1000.	-5.	20.3	.884	.884	0.	120	417.3
120.53	.664	12.1	-4.84	24.93	99.99	19.4	2	4.0	-.8	-1.0	1000.	-5.	20.3	.695	.695	0.	121	420.1
121.53	.667	8.8	-4.84	18.13	99.99	19.4	2	2.8	-.6	-1.0	1000.	-5.	20.3	.505	.505	0.	122	422.6
122.54	.669	5.5	-4.84	11.33	99.99	19.4	1	1.7	-.6	-1.0	1000.	-5.	20.3	.523	.523	0.	123	415.0
123.54	.670	2.2	-4.84	4.53	99.99	19.4	1	.7	-.3	-1.0	1000.	-5.	20.3	.209	.209	0.	124	416.4
124.54	.671	0.0	-3.23	0.00	11.44	19.3	1	0.0	.0	.3	1000.	2.	20.3	-.000	-.000	4.	125	252.3
125.54	.671	0.0	0.00	0.00	11.44	19.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	126	0.0
126.54	.671	0.0	0.00	0.00	11.44	19.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	127	0.0
127.54	.671	0.0	0.00	0.00	11.44	19.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	128	0.0
128.54	.671	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	129	0.0
129.54	.671	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	130	0.0
130.54	.671	0.0	0.00	0.00	11.44	18.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	131	0.0
131.54	.671	0.0	0.00	0.00	11.44	18.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	132	0.0
132.54	.671	0.0	0.00	0.00	11.44	18.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	133	0.0
133.54	.671	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	134	0.0
134.54	.671	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	135	0.0
135.54	.671	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	136	0.0
136.54	.671	0.0	0.00	0.00	11.44	18.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	137	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.HOT	SEG	BRAKES
137.54	.671	0.0	0.00	0.00	11.44	18.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	138	0.0
138.54	.671	0.0	0.00	0.00	11.44	18.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	139	0.0
139.54	.671	0.0	0.00	0.00	11.44	18.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	140	0.0
140.54	.671	0.0	0.00	0.00	11.44	18.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	141	0.0
141.54	.671	0.0	0.00	0.00	11.44	17.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	142	0.0
142.54	.671	0.0	0.00	0.00	11.44	17.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	143	0.0
143.54	.671	0.0	0.00	0.00	11.44	17.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	144	0.0
144.54	.671	0.0	0.00	0.00	11.44	17.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	145	0.0
145.54	.671	0.0	0.00	0.00	11.44	17.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	146	0.0
146.54	.671	0.0	0.00	0.00	11.44	17.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	147	0.0
147.54	.671	0.0	0.00	0.00	11.44	17.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	148	0.0
148.54	.671	0.0	0.00	0.00	11.44	17.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	149	0.0
149.54	.671	0.0	0.00	0.00	11.44	17.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	150	0.0
150.54	.671	0.0	0.00	0.00	11.44	17.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	151	0.0
151.54	.671	0.0	0.00	0.00	11.44	17.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	152	0.0
152.54	.671	0.0	0.00	0.00	11.44	17.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	153	0.0
153.54	.671	0.0	0.00	0.00	11.44	17.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	154	0.0
154.54	.671	0.0	0.00	0.00	11.44	16.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	155	0.0
155.54	.671	0.0	0.00	0.00	11.44	16.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	156	0.0
156.54	.671	0.0	0.00	0.00	11.44	16.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	157	0.0
157.54	.671	0.0	0.00	0.00	11.44	16.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	158	0.0
158.54	.671	0.0	0.00	0.00	11.44	16.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	159	0.0
159.54	.671	0.0	0.00	0.00	11.44	16.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	160	0.0
160.54	.671	0.0	0.00	0.00	11.44	16.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	161	0.0
161.54	.671	0.0	0.00	0.00	11.44	16.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	162	0.0
162.54	.671	0.0	0.00	0.00	11.44	16.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	163	0.0
163.55	.671	3.3	4.84	2.84	.57	16.3	1	.4	5.7	12.1	1000.	64.	13.1	.314	.509	37.	164	0.0
164.55	.672	6.6	4.84	4.39	.55	16.2	1	.9	11.4	16.2	1081.	79.	9.7	.591	.802	46.	165	0.0
165.55	.675	9.9	4.84	4.84	.55	16.1	1	1.3	17.1	22.1	1284.	90.	7.3	.734	.885	54.	166	0.0
166.55	.678	13.2	4.84	5.26	.52	15.9	1	1.9	23.0	29.0	1489.	102.	5.9	.844	.904	60.	167	0.0
167.55	.682	16.5	4.84	5.54	.49	15.7	1	2.5	28.9	36.5	1727.	111.	5.3	.909	.909	64.	168	0.0
168.55	.687	19.8	4.84	5.81	.47	15.5	1	3.3	34.9	42.9	2012.	112.	5.9	.936	.936	66.	169	0.0
169.51	.693	22.2	3.52	7.63	.48	15.4	2	3.9	29.3	36.0	1583.	119.	4.3	.805	.901	68.	170	0.0
170.51	.699	24.3	3.08	8.44	.49	15.3	2	4.5	28.8	35.2	1623.	114.	4.8	.860	.904	66.	171	0.0
171.51	.706	25.8	2.20	10.26	.53	15.2	2	4.9	23.4	28.5	1623.	92.	7.2	.913	.913	55.	172	0.0
172.45	.713	26.4	.88	17.69	.59	15.2	3	5.1	12.6	15.1	1203.	66.	12.0	.829	.903	40.	173	0.0
173.44	.720	25.7	-1.03	52.96	99.99	15.3	3	5.3	-1.2	-1.0	1000.	-5.	20.3	.971	.971	0.	174	28.5
174.44	.727	25.1	-.88	51.72	99.99	15.4	3	5.0	-1.2	-1.0	1000.	-5.	20.3	.948	.948	0.	175	14.2
175.44	.734	24.7	-.59	43.77	25.24	15.5	3	4.6	-.1	.1	1000.	1.	20.3	.933	.933	3.	176	0.0
176.48	.741	25.0	.44	24.10	.63	15.6	3	4.7	8.2	9.9	1074.	48.	15.7	.879	.903	30.	177	0.0
177.49	.748	25.2	.29	26.80	.66	15.7	3	4.7	7.1	8.6	1055.	43.	16.7	.902	.902	26.	178	0.0
178.50	.755	25.4	.29	26.78	.66	15.7	3	4.8	7.2	8.7	1062.	43.	16.6	.903	.903	27.	179	0.0
179.50	.762	25.8	.59	21.52	.61	15.8	3	4.9	9.9	11.8	1129.	55.	14.3	.863	.904	34.	180	0.0
180.58	.770	27.2	2.05	10.79	.53	15.7	2	5.4	23.5	28.4	1689.	88.	7.7	.924	.924	53.	181	0.0
181.65	.778	26.5	-1.03	54.61	99.99	15.8	3	5.6	-1.2	-1.0	1000.	-5.	20.3	1.001	.999	0.	182	27.3
182.65	.785	24.0	-3.67	49.46	99.99	15.9	3	7.5	-1.1	-1.0	1000.	-5.	20.3	.906	.906	0.	183	296.3

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.HOT	SEG BRAKES
183.65	.792	22.7	-1.91	46.78	99.99	16.0	3	5.3	-1.1	-1.0	1000.	-5.	20.3	.857	.857	0.	184	121.0
184.65	.798	19.4	-4.84	39.98	99.99	16.0	3	6.7	-.9	-1.0	1000.	-5.	20.3	.733	.733	0.	185	419.6
185.67	.803	17.7	-2.49	36.47	99.99	16.1	2	4.3	-1.2	-1.0	1000.	-5.	20.3	1.016	.984	0.	186	177.8
186.68	.808	17.2	-.73	35.44	99.99	16.2	2	2.9	-1.2	-1.0	1000.	-5.	20.3	.987	.987	0.	187	.6
187.74	.813	18.1	1.32	13.64	.60	16.1	2	2.9	10.7	13.1	1179.	59.	13.5	.881	.903	36.	188	0.0
188.75	.818	18.6	.73	18.43	.67	16.2	2	3.0	7.4	9.1	1154.	41.	16.6	.925	.925	27.	189	0.0
189.77	.824	20.0	2.05	10.28	.57	16.1	2	3.3	16.7	20.5	1346.	80.	9.0	.853	.904	48.	190	0.0
190.78	.830	22.2	3.23	8.03	.50	16.0	2	3.9	27.2	33.4	1556.	113.	4.8	.819	.902	65.	191	0.0
191.78	.836	24.5	3.37	8.00	.48	15.9	2	4.5	31.4	38.4	1658.	122.	4.2	.848	.904	69.	192	0.0
192.78	.843	27.3	4.11	7.04	.45	15.7	2	5.4	41.9	51.1	1833.	146.	2.5	.855	.904	81.	193	0.0
193.78	.851	30.5	4.69	6.01	.47	15.5	2	6.5	53.1	64.6	2005.	169.	1.7	.873	.903	92.	194	0.0
194.78	.860	33.5	4.40	6.30	.47	15.2	2	7.7	55.7	67.9	2125.	168.	2.1	.905	.905	92.	195	0.0
195.78	.870	36.2	3.96	7.17	.45	15.0	2	8.9	55.6	66.6	2249.	156.	2.9	.924	.924	86.	196	0.0
196.72	.879	37.3	1.61	13.17	.49	15.0	3	9.4	28.9	34.3	1621.	111.	5.1	.869	.904	64.	197	0.0
197.83	.891	39.3	2.93	9.20	.45	14.9	2	10.4	47.9	56.3	2381.	124.	5.3	.943	.948	73.	198	0.0
198.76	.902	40.5	1.76	12.63	.47	14.9	3	11.0	34.2	40.6	1730.	123.	4.2	.884	.902	70.	199	0.0
199.76	.913	42.1	2.35	10.65	.45	14.8	3	11.9	44.0	52.1	1854.	148.	2.5	.858	.904	82.	200	0.0
200.76	.925	43.5	2.05	11.53	.46	14.7	3	12.7	41.7	49.5	1853.	140.	3.0	.887	.900	78.	201	0.0
201.76	.937	45.1	2.35	10.40	.46	14.7	3	13.7	48.1	56.9	1935.	155.	2.2	.880	.903	85.	202	0.0
202.76	.950	46.0	1.32	14.42	.48	14.7	3	14.3	34.0	39.6	1883.	110.	5.7	.923	.923	65.	203	0.0
203.76	.963	46.8	1.17	15.10	.49	14.7	3	14.8	32.6	37.9	1905.	104.	6.5	.928	.928	62.	204	0.0
204.76	.976	47.5	1.03	15.85	.50	14.7	3	15.3	31.2	36.0	1918.	99.	7.2	.935	.935	59.	205	0.0
205.76	.989	47.5	0.00	25.45	.64	14.8	3	15.3	15.3	17.5	1856.	50.	13.4	.966	.966	36.	206	0.0
206.77	1.002	47.3	-.29	30.63	.74	14.9	3	15.1	10.7	12.4	1841.	35.	15.7	.970	.970	29.	207	0.0
207.75	1.015	47.2	-.15	28.11	.68	15.0	3	15.1	12.8	14.7	1837.	42.	14.6	.970	.970	32.	208	0.0
208.76	1.028	47.0	-.29	30.83	.74	15.1	3	14.9	10.5	12.2	1829.	35.	15.8	.970	.970	29.	209	0.0
209.76	1.041	47.0	0.00	25.64	.64	15.1	3	14.9	14.9	17.1	1837.	49.	13.5	.966	.966	36.	210	0.0
210.76	1.055	47.0	0.00	25.64	.64	15.2	3	14.9	14.9	17.1	1837.	49.	13.5	.966	.966	36.	211	0.0
211.76	1.068	47.0	0.00	25.64	.64	15.3	3	14.9	14.9	17.1	1837.	49.	13.5	.966	.966	36.	212	0.0
212.76	1.081	47.0	0.00	25.64	.64	15.4	3	14.9	14.9	17.1	1837.	49.	13.5	.966	.966	36.	213	0.0
213.77	1.094	47.2	.29	21.69	.58	15.4	3	15.1	19.5	22.3	1860.	63.	11.5	.958	.958	42.	214	0.0
214.78	1.107	47.4	.29	21.65	.58	15.5	3	15.2	19.7	22.5	1858.	63.	11.4	.958	.958	42.	215	0.0
215.79	1.120	47.9	.73	17.67	.52	15.5	3	15.6	26.9	30.9	1915.	85.	8.8	.945	.945	53.	216	0.0
216.79	1.134	48.5	.88	16.71	.51	15.5	3	16.0	29.8	34.2	1944.	92.	8.0	.942	.942	56.	217	0.0
217.79	1.147	49.1	.88	16.68	.50	15.5	3	16.4	30.4	34.8	1967.	93.	8.0	.943	.943	57.	218	0.0
218.78	1.161	49.5	.59	18.57	.53	15.5	3	16.7	26.2	29.9	1966.	80.	9.5	.951	.951	51.	219	0.0
219.78	1.175	50.0	.73	17.51	.52	15.6	3	17.1	28.9	33.1	1994.	87.	8.8	.947	.947	54.	220	0.0
220.78	1.189	50.6	.88	16.58	.50	15.6	3	17.5	32.0	36.5	2024.	95.	7.9	.944	.944	58.	221	0.0
221.78	1.203	51.0	.59	18.40	.53	15.6	3	17.8	27.6	31.5	2022.	82.	9.4	.953	.953	52.	222	0.0
222.78	1.217	51.5	.73	17.36	.51	15.6	3	18.2	30.4	34.7	2043.	89.	8.6	.949	.949	55.	223	0.0
223.78	1.232	52.2	1.03	15.58	.48	15.6	3	18.7	36.2	41.4	2090.	104.	6.9	.943	.943	63.	224	0.0
224.78	1.246	53.2	1.47	13.46	.46	15.6	3	19.5	44.9	51.8	2154.	126.	4.7	.933	.933	73.	225	0.0
225.78	1.261	54.1	1.32	14.11	.46	15.6	3	20.3	43.5	49.6	2173.	120.	5.3	.940	.940	70.	226	0.0
226.78	1.276	54.6	.73	17.02	.50	15.6	3	20.7	33.6	38.3	2164.	93.	8.3	.953	.953	58.	227	0.0
227.78	1.291	54.9	.44	18.98	.53	15.6	3	21.0	28.8	32.6	2160.	79.	9.9	.960	.960	52.	228	0.0
228.76	1.306	55.0	.15	21.50	.57	15.7	3	21.0	23.7	26.9	2149.	66.	11.4	.966	.966	46.	229	0.0

10/23/78

VEHICLE PERFORMANCE SIMULATION

DRIVING SCHEDULE (UDC001)

USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
229.74	1.321	54.9	-.15	24.99	.63	15.7	3	21.0	18.3	20.9	2137.	51.	13.0	.970	.970	39.	230	0.0
230.74	1.336	54.6	-.44	29.37	.74	15.8	3	20.7	12.9	15.0	2125.	37.	14.5	.970	.970	32.	231	0.0
231.74	1.352	54.6	0.00	23.28	.60	15.9	3	20.7	20.7	23.5	2125.	58.	12.2	.970	.970	42.	232	0.0
232.75	1.367	54.8	.29	20.21	.55	15.9	3	20.9	26.0	29.5	2149.	72.	10.7	.963	.963	48.	233	0.0
233.75	1.382	55.1	.44	18.95	.53	16.0	3	21.1	29.0	32.8	2167.	79.	9.9	.960	.960	52.	234	0.0
234.74	1.398	55.5	.59	17.78	.51	16.0	3	21.5	32.1	36.4	2188.	87.	9.0	.958	.958	56.	235	0.0
235.76	1.413	55.7	.29	20.04	.54	16.0	3	21.6	26.9	30.5	2183.	73.	10.6	.964	.964	49.	236	0.0
236.75	1.429	56.1	.59	17.70	.51	16.0	3	22.0	32.7	37.1	2211.	88.	8.9	.958	.958	56.	237	0.0
237.76	1.444	56.3	.29	19.92	.54	16.1	3	22.2	27.5	31.1	2206.	74.	10.5	.964	.964	50.	238	0.0
238.76	1.460	56.6	.44	18.69	.52	16.1	3	22.4	30.5	34.5	2224.	81.	9.7	.961	.961	53.	239	0.0
239.74	1.475	56.7	.15	21.12	.56	16.1	3	22.5	25.3	28.7	2214.	68.	11.2	.967	.967	47.	240	0.0
240.74	1.491	56.7	0.00	22.67	.58	16.2	3	22.5	22.5	25.6	2207.	61.	12.0	.970	.970	44.	241	0.0
241.75	1.507	56.5	-.29	26.32	.66	16.2	3	22.4	17.0	19.6	2199.	47.	13.5	.970	.970	37.	242	0.0
242.75	1.523	56.5	0.00	22.72	.59	16.3	3	22.4	22.3	25.4	2199.	61.	12.0	.970	.970	44.	243	0.0
243.75	1.539	56.5	0.00	22.72	.59	16.3	3	22.4	22.3	25.4	2199.	61.	12.0	.970	.970	44.	244	0.0
244.75	1.554	56.5	0.00	22.72	.59	16.4	3	22.4	22.3	25.4	2199.	61.	12.0	.970	.970	44.	245	0.0
245.75	1.570	56.5	0.00	22.72	.59	16.4	3	22.4	22.3	25.4	2199.	61.	12.0	.970	.970	44.	246	0.0
246.75	1.586	56.5	0.00	22.72	.59	16.5	3	22.4	22.3	25.4	2199.	61.	12.0	.970	.970	44.	247	0.0
247.73	1.601	56.4	-.15	24.50	.62	16.5	3	22.3	19.5	22.3	2195.	53.	12.8	.970	.970	40.	248	0.0
248.73	1.617	56.1	-.44	28.74	.72	16.6	3	22.0	14.0	16.3	2184.	39.	14.3	.970	.970	34.	249	0.0
249.73	1.632	55.8	-.44	28.87	.72	16.7	3	21.7	13.8	16.0	2172.	39.	14.4	.970	.970	33.	250	0.0
250.72	1.647	55.1	-1.03	38.50	2.15	16.7	3	21.1	2.7	4.0	2145.	10.	18.9	.970	.970	20.	251	0.0
251.73	1.663	54.6	-.73	34.05	1.01	16.8	3	20.7	7.7	9.5	2125.	23.	16.5	.970	.970	26.	252	0.0
252.72	1.678	54.2	-.59	31.95	.86	16.9	3	20.4	10.0	11.9	2110.	30.	15.5	.970	.970	29.	253	0.0
253.74	1.693	54.0	-.29	27.24	.68	17.0	3	20.2	15.1	17.4	2102.	44.	13.8	.970	.970	35.	254	0.0
254.74	1.708	53.7	-.44	29.71	.75	17.0	3	19.9	12.3	14.3	2090.	36.	14.7	.970	.970	32.	255	0.0
255.71	1.723	53.6	-.15	25.42	.64	17.1	3	19.9	17.2	19.7	2086.	50.	13.1	.970	.970	38.	256	0.0
256.71	1.737	53.9	.44	19.15	.53	17.1	3	20.1	27.8	31.5	2122.	78.	10.0	.959	.959	51.	257	0.0
257.69	1.752	54.0	.15	21.73	.57	17.1	3	20.2	22.8	25.9	2112.	64.	11.5	.966	.966	45.	258	0.0
258.67	1.767	54.1	.15	21.70	.57	17.1	3	20.3	22.9	26.0	2115.	65.	11.5	.966	.966	45.	259	0.0
259.67	1.782	54.1	0.00	23.42	.60	17.2	3	20.3	20.3	23.0	2106.	57.	12.3	.970	.970	41.	260	0.0
260.67	1.797	53.8	-.44	29.68	.75	17.2	3	20.0	12.3	14.4	2094.	36.	14.7	.970	.970	32.	261	0.0
261.66	1.812	53.4	-.59	32.31	.88	17.3	3	19.7	9.5	11.3	2079.	28.	15.7	.970	.970	28.	262	0.0
262.66	1.826	53.0	-.59	32.48	.89	17.4	3	19.4	9.2	11.0	2063.	28.	15.8	.970	.970	28.	263	0.0
263.65	1.841	52.6	-.59	32.67	.90	17.4	3	19.1	9.0	10.7	2047.	27.	15.9	.970	.970	27.	264	0.0
264.66	1.855	52.1	-.73	35.38	1.13	17.5	3	18.7	6.3	7.8	2028.	20.	17.2	.970	.970	24.	265	0.0
265.69	1.871	52.4	.44	19.38	.54	17.5	3	18.9	26.4	30.0	2065.	76.	10.1	.958	.958	50.	266	0.0
266.69	1.885	52.0	-.59	32.92	.92	17.6	3	18.6	8.6	10.3	2024.	27.	16.0	.970	.970	27.	267	0.0
267.67	1.899	51.9	-.15	25.99	.65	17.6	3	18.5	16.0	18.3	2020.	48.	13.3	.970	.970	36.	268	0.0
268.68	1.914	51.7	-.29	28.12	.71	17.7	3	18.3	13.5	15.6	2012.	41.	14.1	.970	.970	33.	269	0.0
269.69	1.928	51.5	-.29	28.19	.71	17.7	3	18.2	13.3	15.4	2005.	40.	14.1	.970	.970	33.	270	0.0
270.67	1.942	51.6	.15	22.30	.58	17.8	3	18.3	20.8	23.7	2021.	61.	11.8	.964	.964	43.	271	0.0
271.68	1.957	51.8	.29	20.78	.56	17.8	3	18.4	23.3	26.5	2035.	68.	11.0	.961	.961	46.	272	0.0
272.68	1.971	52.1	.44	19.46	.54	17.8	3	18.7	26.1	29.6	2053.	76.	10.2	.958	.958	49.	273	0.0
273.67	1.986	52.5	.59	18.20	.52	17.8	3	19.0	29.0	33.0	2077.	84.	9.3	.954	.954	53.	274	0.0
274.68	2.000	53.0	.73	17.20	.51	17.8	3	19.4	31.9	36.4	2105.	91.	8.5	.951	.951	57.	275	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
275.68	2.015	53.5	.73	17.14	.50	17.8	3	19.8	32.5	37.0	2123.	91.	8.4	.952	.952	57.	276	0.0
276.69	2.030	54.0	.73	17.09	.50	17.8	3	20.2	33.0	37.6	2142.	92.	8.4	.952	.952	57.	277	0.0
277.69	2.045	54.9	1.32	14.03	.46	17.7	3	21.0	44.5	50.8	2203.	121.	5.2	.941	.941	71.	278	0.0
278.69	2.061	55.4	.73	16.93	.50	17.7	3	21.4	34.5	39.2	2193.	94.	8.2	.954	.954	59.	279	0.0
279.70	2.076	55.6	.29	20.06	.55	17.7	3	21.6	26.8	30.4	2179.	73.	10.6	.963	.963	49.	280	0.0
280.70	2.092	56.0	.59	17.71	.51	17.7	3	21.9	32.6	37.0	2207.	88.	8.9	.958	.958	56.	281	0.0
281.70	2.107	56.0	0.00	22.87	.59	17.8	3	21.9	21.9	24.9	2180.	60.	12.1	.970	.970	43.	282	0.0
282.71	2.123	55.8	-.29	26.57	.66	17.8	3	21.7	16.5	19.0	2172.	46.	13.6	.970	.970	37.	283	0.0
283.71	2.138	55.2	-.88	36.23	1.31	17.9	3	21.2	5.4	7.0	2149.	17.	17.5	.970	.970	23.	284	0.0
284.71	2.154	54.5	-1.03	38.94	2.31	17.9	3	20.6	2.4	3.6	2121.	9.	19.2	.970	.970	20.	285	0.0
285.71	2.169	53.6	-1.32	57.80	99.99	18.0	3	20.2	-2.8	-2.0	1902.	-5.	20.3	1.064	.940	11.	286	0.0
286.71	2.183	52.5	-1.61	80.78	99.99	18.1	3	20.0	-7.5	-6.6	1856.	-19.	20.5	1.068	.936	4.	287	0.0
287.71	2.198	51.5	-1.47	72.65	99.99	18.2	3	18.9	-5.7	-4.8	1815.	-14.	20.6	1.072	.933	6.	288	0.0
288.71	2.212	51.5	0.00	24.15	.61	18.2	3	18.2	18.2	20.7	2008.	54.	12.5	.969	.969	39.	289	0.0
289.71	2.226	51.5	0.00	24.15	.61	18.3	3	18.2	18.2	20.7	2008.	54.	12.5	.969	.969	39.	290	0.0
290.70	2.240	51.1	-.59	33.42	.94	18.3	3	17.9	8.1	9.7	1989.	26.	16.3	.970	.970	26.	291	0.0
291.70	2.255	50.1	-1.47	78.80	99.99	18.4	3	17.9	-6.0	-5.2	1746.	-16.	20.8	1.083	.923	4.	292	0.0
292.37	2.264	50.0	-.15	26.74	.67	18.4	3	17.1	14.6	16.8	1946.	45.	13.7	.970	.970	35.	293	0.0
293.35	2.278	50.1	.15	22.67	.59	18.5	3	17.1	19.6	22.3	1964.	60.	11.9	.963	.963	41.	294	0.0
294.33	2.291	50.0	-.15	26.74	.67	18.5	3	17.1	14.6	16.8	1946.	45.	13.7	.970	.970	35.	295	0.0
295.32	2.305	49.6	-.59	34.64	.98	18.5	3	16.8	7.3	8.8	1931.	24.	17.0	.970	.970	25.	296	0.0
296.30	2.318	49.5	-.15	26.97	.67	18.6	3	16.7	14.3	16.4	1927.	45.	13.9	.970	.970	34.	297	0.0
297.30	2.332	49.5	0.00	24.76	.63	18.6	3	16.7	16.7	19.1	1932.	52.	12.9	.968	.968	38.	298	0.0
298.30	2.346	49.5	0.00	24.76	.63	18.6	3	16.7	16.7	19.1	1932.	52.	12.9	.968	.968	38.	299	0.0
299.30	2.359	49.1	-.59	35.08	.99	18.7	3	16.4	7.0	8.5	1911.	23.	17.3	.970	.970	24.	300	0.0
300.30	2.373	48.6	-.73	38.45	1.31	18.7	3	16.0	4.5	5.8	1892.	16.	18.7	.970	.970	21.	301	0.0
301.31	2.387	48.1	-.73	38.93	1.34	18.8	3	15.7	4.3	5.5	1872.	15.	19.0	.970	.970	20.	302	0.0
302.31	2.400	47.2	-1.32	76.05	99.99	18.9	3	15.7	-4.6	-3.7	1607.	-12.	20.9	1.109	.901	4.	303	0.0
303.31	2.413	46.1	-1.61	95.00	99.99	19.0	3	15.5	-6.7	-5.8	1555.	-19.	20.9	1.119	.893	0.	304	14.5
304.31	2.425	45.0	-1.61	92.73	99.99	19.0	3	14.9	-6.1	-5.2	1505.	-18.	20.9	1.129	.886	0.	305	20.6
305.31	2.438	43.8	-1.76	90.26	99.99	19.1	3	14.4	-5.4	-4.6	1443.	-17.	20.8	1.146	.873	0.	306	42.7
306.31	2.450	42.6	-1.76	87.78	99.99	19.2	3	13.7	-4.7	-4.0	1384.	-15.	20.8	1.163	.860	0.	307	49.2
307.31	2.462	41.5	-1.61	85.52	99.99	19.3	3	12.8	-4.2	-3.5	1330.	-14.	20.7	1.178	.849	0.	308	39.7
308.31	2.473	40.3	-1.76	83.05	99.99	19.3	3	12.4	-3.7	-3.0	1274.	-12.	20.7	1.195	.837	0.	309	61.3
309.31	2.484	39.5	-2.64	79.34	99.99	19.4	3	12.9	-2.5	-2.3	1188.	-10.	20.6	1.224	.817	0.	310	162.9
310.31	2.494	37.0	-2.20	76.25	99.99	19.4	3	11.4	-1.8	-1.5	1086.	-7.	20.4	1.287	.777	0.	311	126.8
311.31	2.504	35.2	-2.64	72.54	99.99	19.5	3	11.2	-1.6	-1.0	1000.	-5.	20.3	1.329	.752	0.	312	175.3
312.31	2.514	33.8	-2.05	69.65	99.99	19.6	3	9.7	-1.6	-1.0	1000.	-5.	20.3	1.276	.783	0.	313	118.4
313.31	2.523	32.5	-1.91	66.97	99.99	19.6	3	8.9	-1.5	-1.0	1000.	-5.	20.3	1.227	.815	0.	314	106.5
314.31	2.532	31.5	-1.47	64.91	99.99	19.7	3	7.9	-1.5	-1.0	1000.	-5.	20.3	1.190	.841	0.	315	63.9
315.31	2.541	30.6	-1.32	63.06	99.99	19.7	3	7.4	-1.4	-1.0	1000.	-5.	20.3	1.156	.865	0.	316	50.3
316.12	2.547	30.5	-.15	36.46	.85	19.7	3	6.5	5.0	5.9	1200.	26.	18.7	.960	.960	19.	317	0.0
317.12	2.556	30.0	-.73	56.68	99.99	19.8	3	6.4	-.7	-.4	1000.	-2.	20.3	1.133	.883	2.	318	0.0
318.12	2.564	29.0	-1.47	59.76	99.99	19.8	3	7.0	-1.4	-1.0	1000.	-5.	20.3	1.095	.913	0.	319	67.9
319.12	2.572	27.5	-2.20	56.67	99.99	19.9	3	7.3	-1.3	-1.0	1000.	-5.	20.3	1.039	.963	0.	320	143.6
320.12	2.579	24.8	-3.96	51.10	99.99	19.9	3	8.1	-1.2	-1.0	1000.	-5.	20.3	.937	.937	0.	321	324.4

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
321.12	2.586	21.5	-4.84	44.30	99.99	19.9	3	7.6	-1.0	-1.0	1000.	-5.	20.3	.812	.812	0.	322	417.2
322.12	2.591	20.1	-2.05	41.42	99.99	19.9	3	4.6	-.9	-1.0	1000.	-5.	20.3	.759	.759	0.	323	138.2
323.12	2.597	19.1	-1.47	39.36	99.99	20.0	3	3.9	-.9	-1.0	1000.	-5.	20.3	.721	.721	0.	324	80.9
324.12	2.602	18.5	-.88	38.12	99.99	20.0	3	3.3	-.9	-1.0	1000.	-5.	20.3	.699	.699	0.	325	22.3
325.14	2.607	17.0	-2.20	35.03	99.99	20.0	2	3.9	-1.2	-1.0	1000.	-5.	20.3	.976	.976	0.	326	149.2
326.14	2.612	15.5	-2.20	31.94	99.99	20.0	2	3.5	-1.1	-1.0	1000.	-5.	20.3	.890	.890	0.	327	150.7
327.14	2.616	12.5	-4.40	25.76	99.99	20.0	2	3.9	-.9	-1.0	1000.	-5.	20.3	.718	.718	0.	328	375.4
328.14	2.619	10.8	-2.49	22.26	99.99	20.0	2	2.4	-.8	-1.0	1000.	-5.	20.3	.620	.620	0.	329	183.9
329.14	2.621	8.0	-4.11	16.49	99.99	20.0	2	2.3	-.6	-1.0	1000.	-5.	20.3	.459	.459	0.	330	349.4
330.15	2.623	4.7	-4.84	9.69	99.99	20.0	1	1.5	-.5	-1.0	1000.	-5.	20.3	.447	.447	0.	331	415.3
331.15	2.624	1.4	-4.84	2.88	99.99	20.0	1	.4	-.2	-1.0	1000.	-5.	20.3	.133	.133	0.	332	416.7
332.16	2.624	0.0	-2.05	0.00	11.44	20.0	1	0.0	.0	.3	1000.	2.	20.3	-.000	-.000	4.	333	131.6
333.16	2.624	0.0	0.00	0.00	11.44	20.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	334	0.0
334.16	2.624	0.0	0.00	0.00	11.44	19.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	335	0.0
335.16	2.624	0.0	0.00	0.00	11.44	19.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	336	0.0
336.16	2.624	0.0	0.00	0.00	11.44	19.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	337	0.0
337.16	2.624	0.0	0.00	0.00	11.44	19.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	338	0.0
338.16	2.624	0.0	0.00	0.00	11.44	19.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	339	0.0
339.16	2.624	0.0	0.00	0.00	11.44	19.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	340	0.0
340.16	2.624	0.0	0.00	0.00	11.44	19.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	341	0.0
341.16	2.624	0.0	0.00	0.00	11.44	19.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	342	0.0
342.16	2.624	0.0	0.00	0.00	11.44	19.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	343	0.0
343.16	2.624	0.0	0.00	0.00	11.44	19.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	344	0.0
344.16	2.624	0.0	0.00	0.00	11.44	19.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	345	0.0
345.16	2.624	0.0	0.00	0.00	11.44	19.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	346	0.0
346.15	2.624	1.0	1.47	1.46	1.00	19.6	1	.1	.6	4.1	1000.	22.	18.9	.095	.169	14.	347	0.0
347.15	2.625	4.3	4.84	3.56	.56	19.6	1	.5	7.4	12.8	1000.	67.	12.3	.409	.630	39.	348	0.0
348.15	2.627	7.6	4.84	4.55	.55	19.6	1	1.0	13.1	18.0	1140.	83.	8.6	.635	.838	49.	349	0.0
349.15	2.629	10.9	4.84	4.96	.54	19.5	1	1.5	18.9	24.1	1342.	94.	6.7	.773	.896	56.	350	0.0
350.15	2.633	14.2	4.84	5.37	.51	19.4	1	2.1	24.7	31.1	1552.	105.	5.6	.871	.903	61.	351	0.0
351.15	2.637	17.3	4.55	5.83	.49	19.4	1	2.7	28.7	36.0	1786.	106.	6.0	.922	.922	62.	352	0.0
352.13	2.642	20.0	3.96	6.87	.48	19.3	2	3.3	29.1	36.2	1538.	123.	3.8	.746	.889	70.	353	0.0
353.13	2.648	22.5	3.67	7.45	.48	19.2	2	4.0	30.9	37.8	1609.	124.	3.9	.803	.901	70.	354	0.0
354.13	2.655	23.7	1.76	11.68	.55	19.2	3	4.3	17.8	21.9	1276.	90.	7.3	.701	.874	54.	355	0.0
355.14	2.661	25.2	2.20	10.19	.53	19.1	2	4.7	22.8	27.9	1592.	92.	7.2	.909	.909	55.	356	0.0
356.14	2.669	26.6	2.05	10.75	.53	19.1	2	5.2	22.9	27.8	1656.	88.	7.7	.922	.922	53.	357	0.0
357.14	2.676	28.1	2.20	10.43	.52	19.1	2	5.7	25.8	31.1	1745.	94.	7.2	.925	.925	56.	358	0.0
358.14	2.684	30.0	2.79	9.26	.48	19.0	2	6.3	33.6	40.6	1870.	114.	5.4	.921	.921	66.	359	0.0
359.08	2.692	30.8	1.17	15.08	.56	19.0	3	6.6	18.3	21.8	1374.	83.	8.4	.847	.904	50.	360	0.0
360.08	2.701	31.6	1.17	15.09	.55	19.0	3	6.9	18.9	22.6	1396.	85.	8.2	.855	.904	51.	361	0.0
361.09	2.710	32.1	.73	18.40	.59	19.0	3	7.1	14.7	17.7	1344.	69.	11.0	.902	.902	43.	362	0.0
362.09	2.719	32.8	1.03	15.98	.56	19.0	3	7.4	18.4	21.9	1405.	82.	8.6	.892	.903	50.	363	0.0
363.09	2.728	33.6	1.17	15.09	.54	18.9	3	7.7	20.5	24.4	1451.	88.	7.6	.875	.903	53.	364	0.0
364.09	2.737	34.5	1.32	14.36	.53	18.9	3	8.1	22.9	27.0	1500.	95.	6.8	.868	.904	56.	365	0.0
365.07	2.747	34.6	.15	27.55	.65	18.9	3	8.2	9.8	11.5	1382.	44.	15.7	.946	.946	30.	366	0.0
366.07	2.757	34.9	.44	22.08	.61	19.0	3	8.3	13.3	15.4	1419.	57.	13.0	.929	.929	37.	367	0.0

VEHICLE PERFORMANCE SIMULATION

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
367.04	2.766	34.8	-.15	34.82	.78	19.0	3	8.2	6.5	7.6	1364.	29.	18.2	.964	.964	23.	368	0.0
368.04	2.776	34.5	-.44	41.60	1.26	19.0	3	8.1	3.2	3.9	1343.	15.	20.1	.970	.970	15.	369	0.0
369.09	2.786	34.7	.29	24.62	.63	19.0	3	8.2	11.5	13.4	1394.	50.	14.4	.940	.940	33.	370	0.0
370.11	2.796	35.5	1.17	15.01	.53	19.0	3	8.6	22.0	26.4	1504.	92.	7.1	.891	.897	55.	371	0.0
371.11	2.806	36.0	.73	18.33	.57	19.0	3	8.8	17.3	20.4	1480.	72.	10.2	.919	.919	45.	372	0.0
372.11	2.816	36.0	0.00	30.45	.69	19.0	3	8.8	8.8	10.2	1420.	38.	16.7	.958	.958	27.	373	0.0
373.11	2.826	36.0	0.00	30.45	.69	19.1	3	8.8	8.8	10.2	1420.	38.	16.7	.958	.958	27.	374	0.0
374.11	2.836	36.0	0.00	30.45	.69	19.1	3	8.8	8.8	10.2	1420.	38.	16.7	.958	.958	27.	375	0.0
375.11	2.846	36.0	0.00	30.45	.69	19.1	3	8.8	8.8	10.2	1420.	38.	16.7	.958	.958	27.	376	0.0
376.11	2.856	36.0	0.00	30.45	.69	19.1	3	8.8	8.8	10.2	1420.	38.	16.7	.958	.958	27.	377	0.0
377.09	2.865	36.1	.15	26.99	.65	19.2	3	8.8	10.6	12.3	1437.	45.	15.3	.949	.949	31.	378	0.0
378.09	2.875	36.4	.44	21.86	.61	19.2	3	9.0	14.2	16.4	1471.	59.	12.6	.934	.934	38.	379	0.0
379.07	2.885	36.5	.15	26.84	.65	19.2	3	9.0	10.8	12.5	1452.	45.	15.2	.949	.949	31.	380	0.0
380.05	2.895	36.4	-.15	33.98	.76	19.2	3	9.0	7.2	8.4	1425.	31.	17.8	.965	.965	24.	381	0.0
381.04	2.905	36.0	-.59	42.75	1.97	19.2	3	8.8	1.9	2.6	1401.	10.	20.5	.970	.970	13.	382	0.0
382.04	2.915	35.1	-1.32	72.33	99.99	19.3	3	9.2	-1.6	-1.0	1000.	-5.	20.3	1.326	.754	0.	383	42.7
383.04	2.925	34.1	-1.47	70.27	99.99	19.3	3	9.0	-1.6	-1.0	1000.	-5.	20.3	1.283	.777	0.	384	59.5
384.04	2.934	33.5	-.88	69.03	99.99	19.4	3	7.9	-1.6	-1.0	1000.	-5.	20.3	1.265	.790	0.	385	1.2
385.04	2.943	31.4	-3.08	64.71	99.99	19.4	3	10.0	-1.5	-1.0	1000.	-5.	20.3	1.186	.843	0.	386	226.1
386.04	2.952	29.0	-3.52	59.76	99.99	19.5	3	9.5	-1.4	-1.0	1000.	-5.	20.3	1.095	.913	0.	387	274.1
387.04	2.959	25.7	-4.84	52.96	99.99	19.5	3	9.5	-1.2	-1.0	1000.	-5.	20.3	.971	.971	0.	388	411.7
388.04	2.966	23.0	-3.96	47.40	99.99	19.5	3	7.4	-1.1	-1.0	1000.	-5.	20.3	.869	.869	0.	389	306.8
389.04	2.972	20.3	-3.96	41.83	99.99	19.5	3	6.3	-1.0	-1.0	1000.	-5.	20.3	.767	.767	0.	390	330.1
390.05	2.977	17.5	-4.11	36.06	99.99	19.6	2	5.4	-1.2	-1.0	1000.	-5.	20.3	1.005	.905	0.	391	341.5
391.05	2.982	14.5	-4.40	29.88	99.99	19.6	2	4.5	-1.0	-1.0	1000.	-5.	20.3	.832	.832	0.	392	373.7
392.05	2.985	12.0	-3.67	24.73	99.99	19.6	2	3.3	-.8	-1.0	1000.	-5.	20.3	.689	.689	0.	393	302.1
393.05	2.988	8.7	-4.84	17.93	99.99	19.6	2	2.8	-.6	-1.0	1000.	-5.	20.3	.499	.499	0.	394	422.6
394.06	2.990	5.4	-4.84	11.13	99.99	19.6	1	1.7	-.6	-1.0	1000.	-5.	20.3	.514	.514	0.	395	415.0
395.06	2.991	2.1	-4.84	4.33	99.99	19.6	1	.7	-.2	-1.0	1000.	-5.	20.3	.200	.200	0.	396	416.5
396.06	2.991	0.0	-3.08	0.00	11.44	19.6	1	0.0	.0	.3	1000.	2.	20.3	-.000	-.000	4.	397	237.0
397.06	2.991	0.0	0.00	0.00	11.44	19.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	398	0.0
398.06	2.991	0.0	0.00	0.00	11.44	19.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	399	0.0
399.06	2.991	0.0	0.00	0.00	11.44	19.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	400	0.0
400.06	2.991	0.0	0.00	0.00	11.44	19.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	401	0.0
401.06	2.991	0.0	0.00	0.00	11.44	19.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	402	0.0
402.07	2.992	2.6	3.81	2.64	.61	19.4	1	.3	3.6	9.6	1000.	50.	15.6	.247	.410	30.	403	0.0
403.07	2.993	5.9	4.84	4.19	.55	19.4	1	.8	10.2	15.2	1040.	77.	10.2	.540	.770	45.	404	0.0
404.07	2.995	9.2	4.84	4.77	.55	19.3	1	1.2	15.9	20.8	1240.	85.	7.7	.706	.876	52.	405	0.0
405.07	2.998	12.5	4.84	5.19	.53	19.3	1	1.8	21.7	27.4	1446.	99.	6.2	.823	.903	58.	406	0.0
406.07	3.002	15.8	4.84	5.46	.49	19.2	1	2.4	27.6	35.2	1669.	111.	5.2	.902	.902	64.	407	0.0
407.07	3.007	19.1	4.84	5.75	.48	19.1	1	3.1	33.6	41.6	1954.	112.	5.8	.930	.930	66.	408	0.0
408.03	3.012	22.4	4.84	6.09	.45	19.1	2	3.9	39.2	48.5	1704.	149.	3.2	.755	.892	82.	409	0.0
409.03	3.019	25.0	3.81	7.42	.46	19.0	2	4.7	35.7	43.5	1717.	133.	3.4	.836	.903	75.	410	0.0
410.00	3.026	25.6	.83	17.79	.59	19.0	3	4.9	12.2	14.6	1181.	65.	12.3	.818	.902	39.	411	0.0
411.07	3.034	27.5	2.79	9.09	.48	19.0	2	5.5	30.4	37.3	1742.	112.	5.2	.906	.906	65.	412	0.0
412.07	3.042	29.0	2.20	10.59	.51	18.9	2	6.0	26.7	32.2	1784.	94.	7.3	.928	.928	57.	413	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.HOT	SEG	BRAKES
413.02	3.049	30.0	1.47	13.42	.54	18.9	3	6.3	20.6	24.6	1402.	92.	7.1	.808	.901	55.	414	0.0
414.00	3.058	30.1	.15	29.03	.68	18.9	3	6.4	7.8	9.2	1214.	40.	16.8	.936	.936	27.	415	0.0
414.98	3.066	30.0	-.15	36.58	.86	18.9	3	6.3	4.9	5.7	1181.	25.	18.8	.959	.959	19.	416	0.0
415.98	3.074	29.7	-.44	41.45	1.73	19.0	3	6.2	2.0	2.5	1156.	11.	20.0	.970	.970	11.	417	0.0
416.97	3.082	29.3	-.59	43.37	4.93	19.0	3	6.1	.5	.8	1140.	4.	20.5	.970	.970	7.	418	0.0
417.98	3.090	28.8	-.73	55.47	99.99	19.0	3	6.0	-.8	-.5	1000.	-3.	20.3	1.088	.919	1.	419	0.0
418.98	3.098	28.0	-1.17	57.70	99.99	19.1	3	6.2	-1.3	-1.0	1000.	-5.	20.3	1.057	.946	0.	420	39.2
419.98	3.106	25.0	-4.40	51.52	99.99	19.1	3	8.7	-1.2	-1.0	1000.	-5.	20.3	.944	.944	0.	421	368.4
420.98	3.112	21.7	-4.84	44.72	99.99	19.1	3	7.7	-1.0	-1.0	1000.	-5.	20.3	.820	.820	0.	422	416.9
421.98	3.116	18.4	-4.84	37.92	99.99	19.1	3	6.3	-.9	-1.0	1000.	-5.	20.3	.695	.695	0.	423	420.7
422.99	3.122	15.1	-4.84	31.12	99.99	19.1	2	5.0	-1.1	-1.0	1000.	-5.	20.3	.867	.867	0.	424	417.5
423.99	3.126	11.8	-4.84	24.32	99.99	19.1	2	3.8	-.8	-1.0	1000.	-5.	20.3	.677	.677	0.	425	420.4
424.99	3.129	8.5	-4.84	17.52	99.99	19.2	2	2.7	-.6	-1.0	1000.	-5.	20.3	.488	.488	0.	426	422.7
426.00	3.131	5.2	-4.84	10.72	99.99	19.1	1	1.6	-.6	-1.0	1000.	-5.	20.3	.495	.495	0.	427	415.1
427.00	3.132	1.9	-4.84	3.92	99.99	19.1	1	.6	-.2	-1.0	1000.	-5.	20.3	.181	.181	0.	428	416.5
428.00	3.132	0.0	-2.79	0.00	11.44	19.1	1	0.0	.0	.3	1000.	2.	20.3	-.000	-.000	4.	429	207.3
429.00	3.132	0.0	0.00	0.00	11.44	19.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	430	0.0
430.00	3.132	0.0	0.00	0.00	11.44	19.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	431	0.0
431.00	3.132	0.0	0.00	0.00	11.44	19.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	432	0.0
432.00	3.132	0.0	0.00	0.00	11.44	19.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	433	0.0
433.00	3.132	0.0	0.00	0.00	11.44	19.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	434	0.0
434.00	3.132	0.0	0.00	0.00	11.44	19.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	435	0.0
435.00	3.132	0.0	0.00	0.00	11.44	19.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	436	0.0
436.00	3.132	0.0	0.00	0.00	11.44	19.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	437	0.0
437.00	3.132	0.0	0.00	0.00	11.44	19.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	438	0.0
438.00	3.132	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	439	0.0
439.00	3.132	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	440	0.0
440.00	3.132	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	441	0.0
441.00	3.132	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	442	0.0
442.00	3.132	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	443	0.0
443.00	3.132	0.0	0.00	0.00	11.44	18.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	444	0.0
444.00	3.132	0.0	0.00	0.00	11.44	18.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	445	0.0
445.00	3.132	0.0	0.00	0.00	11.44	18.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	446	0.0
446.00	3.132	0.0	0.00	0.00	11.44	18.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	447	0.0
447.01	3.132	3.3	4.84	2.84	.57	18.8	1	.4	5.7	12.1	1000.	64.	13.1	.314	.509	37.	448	0.0
448.01	3.134	6.6	4.84	4.39	.55	18.7	1	.9	11.4	16.2	1081.	79.	9.7	.581	.802	46.	449	0.0
449.01	3.136	9.9	4.84	4.84	.55	18.7	1	1.3	17.1	22.1	1184.	90.	7.3	.734	.885	54.	450	0.0
450.01	3.139	13.2	4.84	5.26	.52	18.6	1	1.9	23.0	29.0	1489.	102.	5.9	.844	.934	60.	451	0.0
451.01	3.143	16.5	4.84	5.54	.49	18.6	1	2.5	28.9	36.5	1727.	111.	5.3	.909	.909	64.	452	0.0
452.01	3.149	19.8	4.84	5.81	.47	18.5	1	3.3	34.9	42.9	2012.	112.	5.9	.936	.936	66.	453	0.0
452.98	3.154	23.1	4.84	6.10	.45	18.4	2	4.1	40.5	49.8	1728.	151.	2.1	.767	.895	83.	454	0.0
453.98	3.161	26.4	4.84	6.03	.46	18.4	2	5.1	46.7	57.0	1859.	161.	1.8	.815	.902	83.	455	0.0
454.98	3.169	27.8	2.05	11.10	.51	18.3	3	5.6	24.1	29.1	1428.	107.	5.2	.735	.896	62.	456	0.0
455.98	3.177	29.1	1.91	11.67	.52	18.3	3	6.0	24.0	28.9	1440.	105.	5.4	.763	.894	61.	457	0.0
457.03	3.185	31.5	3.52	7.95	.45	18.2	2	6.9	43.0	52.2	1933.	138.	3.3	.912	.912	78.	458	0.0
458.10	3.195	33.0	2.20	10.77	.50	18.2	2	7.5	31.1	36.9	2008.	97.	7.7	.944	.944	59.	459	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
458.98	3.203	33.6	.88	16.98	.57	18.2	3	7.7	17.3	20.8	1410.	77.	9.4	.900	.900	47.	460	0.0
460.03	3.213	34.8	1.76	12.55	.50	18.2	3	8.2	28.1	33.4	1574.	111.	5.0	.835	.903	64.	461	0.0
461.03	3.223	35.1	.44	22.06	.61	18.2	3	8.4	13.4	15.5	1426.	57.	13.0	.930	.930	37.	462	0.0
462.04	3.233	35.6	.73	18.34	.58	18.2	3	8.6	17.0	20.1	1466.	72.	10.3	.917	.917	45.	463	0.0
463.04	3.243	36.1	.73	18.33	.57	18.2	3	8.8	17.4	20.5	1484.	73.	10.1	.919	.919	45.	464	0.0
464.02	3.253	36.0	-.15	34.19	.77	18.2	3	8.8	7.0	8.2	1410.	31.	17.9	.965	.965	24.	465	0.0
465.00	3.262	36.1	.15	26.99	.65	18.2	3	8.8	10.6	12.3	1437.	45.	15.3	.949	.949	31.	466	0.0
465.98	3.272	36.2	.15	26.95	.65	18.3	3	8.9	10.6	12.4	1441.	45.	15.3	.949	.949	31.	467	0.0
466.99	3.282	36.0	-.29	37.88	.89	18.3	3	8.8	5.4	6.4	1401.	24.	18.9	.970	.970	20.	468	0.0
467.99	3.292	35.7	-.44	41.16	1.19	18.3	3	8.6	3.5	4.4	1390.	16.	19.9	.970	.970	16.	469	0.0
469.03	3.303	36.0	.44	21.76	.61	18.3	3	8.8	13.9	16.3	1457.	59.	12.6	.933	.933	38.	470	0.0
470.03	3.313	36.0	0.00	30.45	.69	18.3	3	8.8	8.8	10.2	1420.	38.	16.7	.958	.958	27.	471	0.0
471.02	3.322	35.6	-.59	42.73	2.05	18.4	3	8.6	1.8	2.4	1386.	9.	20.5	.970	.970	12.	472	0.0
472.00	3.332	35.5	-.15	34.46	.77	18.4	3	8.6	6.8	8.0	1391.	30.	18.0	.964	.964	23.	473	0.0
472.98	3.342	35.4	-.15	34.51	.77	18.4	3	8.5	6.8	7.9	1387.	30.	18.0	.964	.964	23.	474	0.0
473.99	3.352	35.2	-.29	38.24	.91	18.4	3	8.4	5.1	6.0	1370.	23.	19.1	.970	.970	19.	475	0.0
474.99	3.361	35.2	0.00	30.83	.70	18.5	3	8.4	8.4	9.8	1390.	37.	16.9	.957	.957	27.	476	0.0
475.99	3.371	35.2	0.00	30.83	.70	18.5	3	8.4	8.4	9.8	1390.	37.	16.9	.957	.957	27.	477	0.0
476.99	3.381	35.2	0.00	30.83	.70	18.5	3	8.4	8.4	9.8	1390.	37.	16.9	.957	.957	27.	478	0.0
477.99	3.391	35.2	0.00	30.83	.70	18.5	3	8.4	8.4	9.8	1390.	37.	16.9	.957	.957	27.	479	0.0
478.99	3.401	35.2	0.00	30.83	.70	18.6	3	8.4	8.4	9.8	1390.	37.	16.9	.957	.957	27.	480	0.0
480.00	3.410	35.0	-.29	38.32	.92	18.6	3	8.3	5.0	5.9	1362.	23.	19.1	.970	.970	19.	481	0.0
480.98	3.420	35.1	.15	27.37	.65	18.6	3	8.4	10.1	11.7	1400.	44.	15.6	.947	.947	30.	482	0.0
481.95	3.429	35.2	.15	27.34	.65	18.6	3	8.4	10.1	11.8	1404.	44.	15.5	.947	.947	30.	483	0.0
482.95	3.439	35.5	.44	22.00	.61	18.6	3	8.6	13.6	15.8	1440.	58.	12.9	.931	.931	37.	484	0.0
483.95	3.449	35.2	-.44	41.35	1.22	18.7	3	8.4	3.4	4.2	1370.	16.	20.0	.970	.970	16.	485	0.0
484.97	3.459	35.0	-.29	38.32	.92	18.7	3	8.3	5.0	5.9	1362.	23.	19.1	.970	.970	19.	486	0.0
485.97	3.469	35.0	0.00	30.93	.70	18.7	3	8.3	8.3	9.7	1382.	37.	16.9	.956	.956	26.	487	0.0
486.97	3.478	35.0	0.00	30.93	.70	18.7	3	8.3	8.3	9.7	1382.	37.	16.9	.956	.956	26.	488	0.0
487.98	3.488	34.8	-.29	38.41	.92	18.8	3	8.2	5.0	5.9	1355.	23.	19.1	.970	.970	19.	489	0.0
488.99	3.498	34.6	-.29	38.49	.93	18.8	3	8.2	4.9	5.8	1347.	23.	19.2	.970	.970	19.	490	0.0
489.97	3.507	34.5	-.15	34.98	.78	18.8	3	8.1	6.4	7.5	1353.	29.	18.2	.963	.963	22.	491	0.0
490.96	3.517	33.5	-1.47	69.03	99.99	18.8	3	8.7	-1.6	-1.0	1000.	-5.	20.3	1.265	.790	0.	492	60.6
491.96	3.526	32.0	-2.20	65.94	99.99	18.9	3	9.1	-1.5	-1.0	1000.	-5.	20.3	1.209	.827	0.	493	136.6
492.96	3.534	30.1	-2.79	62.03	99.99	18.9	3	9.0	-1.4	-1.0	1000.	-5.	20.3	1.137	.880	0.	494	199.0
493.96	3.543	28.0	-3.08	57.70	99.99	18.9	3	8.5	-1.3	-1.0	1000.	-5.	20.3	1.057	.946	0.	495	231.4
494.96	3.550	25.5	-3.67	52.55	99.99	19.0	3	8.1	-1.2	-1.0	1000.	-5.	20.3	.963	.963	0.	496	294.3
495.96	3.557	22.5	-4.40	46.37	99.99	19.0	3	7.6	-1.1	-1.0	1000.	-5.	20.3	.850	.850	0.	497	371.7
496.96	3.563	19.8	-3.96	40.80	99.99	19.0	3	6.1	-.9	-1.0	1000.	-5.	20.3	.748	.748	0.	498	330.6
497.97	3.568	16.5	-4.84	34.00	99.99	19.0	2	5.6	-1.2	-1.0	1000.	-5.	20.3	.947	.947	0.	499	416.2
498.97	3.572	13.2	-4.84	27.20	99.99	19.0	2	4.3	-.9	-1.0	1000.	-5.	20.3	.758	.758	0.	500	419.2
499.97	3.575	10.3	-4.25	21.22	99.99	19.0	2	3.1	-.7	-1.0	1000.	-5.	20.3	.591	.591	0.	501	362.0
500.98	3.577	7.2	-4.55	14.84	99.99	19.0	1	2.2	-.8	-1.0	1000.	-5.	20.3	.685	.685	0.	502	384.3
501.98	3.579	4.0	-4.69	8.24	99.99	19.0	1	1.2	-.5	-1.0	1000.	-5.	20.3	.381	.381	0.	503	400.3
502.98	3.580	1.0	-4.40	2.06	99.99	19.0	1	.3	-.1	-1.0	1000.	-5.	20.3	.095	.095	0.	504	371.8
503.98	3.580	0.0	-1.47	0.00	11.44	19.0	1	0.0	.0	.3	1000.	2.	20.3	-.000	-.000	4.	505	72.2

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
504.98	3.580	0.0	0.00	0.00	11.44	19.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	506	0.0
505.98	3.580	0.0	0.00	0.00	11.44	19.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	507	0.0
506.98	3.580	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	508	0.0
507.98	3.580	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	509	0.0
508.98	3.580	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	510	0.0
509.98	3.580	1.2	1.76	1.69	.89	18.9	1	.1	.8	4.8	1000.	25.	18.6	.114	.201	16.	511	0.0
510.98	3.581	3.5	3.37	3.65	.62	18.9	1	.4	4.3	9.2	1000.	48.	16.0	.333	.517	29.	512	0.0
511.98	3.582	5.5	2.93	5.71	.62	18.9	1	.7	6.0	9.3	1000.	49.	15.9	.503	.712	29.	513	0.0
512.98	3.584	6.5	1.47	8.39	.74	18.8	1	.8	4.0	6.2	1000.	33.	17.9	.619	.717	20.	514	0.0
513.98	3.586	8.5	2.93	7.23	.59	18.8	1	1.1	9.3	11.9	1059.	59.	13.8	.764	.894	35.	515	0.0
514.99	3.588	9.6	1.61	10.60	.66	18.8	1	1.3	6.4	8.2	1016.	43.	16.3	.899	.899	26.	516	0.0
515.99	3.591	10.5	1.32	11.85	.70	18.8	1	1.4	6.0	7.6	1030.	37.	17.4	.926	.926	24.	517	0.0
516.97	3.594	11.9	2.05	9.83	.58	18.8	2	1.7	9.6	12.5	1035.	64.	13.0	.660	.853	37.	518	0.0
517.99	3.598	14.0	3.08	7.12	.57	18.8	1	2.1	16.3	20.5	1453.	74.	9.9	.917	.917	46.	519	0.0
518.96	3.602	16.0	2.93	7.75	.55	18.7	2	2.4	17.7	22.4	1288.	91.	7.2	.713	.878	54.	520	0.0
519.96	3.606	17.7	2.49	8.88	.56	18.7	2	2.8	17.2	21.2	1304.	85.	8.1	.779	.897	51.	521	0.0
520.96	3.612	19.0	1.91	10.65	.58	18.7	2	3.1	14.9	18.3	1290.	75.	10.0	.845	.904	45.	522	0.0
521.96	3.617	20.1	1.61	11.81	.59	18.7	2	3.4	13.9	17.2	1297.	70.	11.0	.890	.898	43.	523	0.0
522.96	3.623	21.0	1.32	13.40	.61	18.7	2	3.6	12.6	15.4	1321.	61.	12.5	.913	.913	39.	524	0.0
523.96	3.629	22.0	1.47	12.62	.59	18.6	2	3.8	14.4	17.6	1383.	67.	11.3	.913	.913	42.	525	0.0
524.96	3.635	23.0	1.47	12.70	.59	18.6	2	4.1	15.1	18.4	1434.	67.	11.1	.921	.921	42.	526	0.0
525.92	3.641	23.8	1.17	15.27	.58	18.6	3	4.3	13.4	16.1	1183.	72.	10.9	.760	.893	43.	527	0.0
526.92	3.648	24.5	1.03	16.43	.58	18.6	3	4.5	12.7	15.3	1178.	68.	11.6	.786	.899	41.	528	0.0
527.91	3.655	24.9	.59	21.70	.61	18.6	3	4.6	9.4	11.3	1104.	54.	14.7	.852	.904	33.	529	0.0
528.89	3.661	25.0	.15	30.07	.71	18.6	3	4.7	5.9	7.0	1029.	36.	17.6	.917	.917	22.	530	0.0
529.89	3.668	25.0	0.00	33.40	.81	18.6	3	4.7	4.7	5.5	1012.	29.	18.3	.933	.933	18.	531	0.0
530.89	3.675	25.0	0.00	33.40	.81	18.7	3	4.7	4.7	5.5	1012.	29.	18.3	.933	.933	18.	532	0.0
531.89	3.682	25.0	0.00	33.40	.81	18.7	3	4.7	4.7	5.5	1012.	29.	18.3	.933	.933	18.	533	0.0
532.89	3.689	25.0	0.00	33.40	.81	18.7	3	4.7	4.7	5.5	1012.	29.	18.3	.933	.933	18.	534	0.0
533.89	3.696	25.0	0.00	33.40	.81	18.7	3	4.7	4.7	5.5	1012.	29.	18.3	.933	.933	18.	535	0.0
534.92	3.703	25.6	.88	17.79	.59	18.7	3	4.9	12.2	14.6	1181.	65.	12.3	.818	.902	39.	536	0.0
535.94	3.711	25.8	.29	26.73	.65	18.7	3	4.9	7.3	8.8	1076.	43.	16.6	.906	.906	27.	537	0.0
536.95	3.718	26.0	.29	26.71	.65	18.7	3	5.0	7.4	8.9	1083.	43.	16.5	.907	.907	27.	538	0.0
537.94	3.725	25.6	-.59	44.75	14.03	18.8	3	4.9	-.1	.2	1000.	1.	20.3	.967	.967	3.	539	0.0
538.94	3.732	25.2	-.59	44.32	17.48	18.8	3	4.7	-.1	.2	1000.	1.	20.3	.952	.952	3.	540	0.0
539.95	3.739	25.0	-.29	39.10	1.34	18.8	3	4.7	2.3	2.9	1000.	15.	19.4	.944	.944	11.	541	0.0
540.95	3.746	25.0	0.00	33.40	.81	18.8	3	4.7	4.7	5.5	1012.	29.	18.3	.933	.933	18.	542	0.0
541.95	3.753	25.0	0.00	33.40	.81	18.8	3	4.7	4.7	5.5	1012.	29.	18.3	.933	.933	18.	543	0.0
542.95	3.760	24.4	-.88	50.28	99.99	18.8	3	4.8	-1.1	-1.0	1000.	-5.	20.3	.921	.921	0.	544	15.1
543.95	3.766	23.1	-1.91	47.60	99.99	18.9	3	5.4	-1.1	-1.0	1000.	-5.	20.3	.872	.872	0.	545	120.5
544.95	3.772	19.8	-4.84	40.80	99.99	18.9	3	6.9	-.9	-1.0	1000.	-5.	20.3	.748	.748	0.	546	419.2
545.96	3.777	16.5	-4.84	34.00	99.99	18.9	2	5.6	-1.2	-1.0	1000.	-5.	20.3	.947	.947	0.	547	416.2
546.96	3.782	13.2	-4.84	27.20	99.99	18.9	2	4.3	-.9	-1.0	1000.	-5.	20.3	.758	.758	0.	548	419.2
547.96	3.785	9.9	-4.84	20.40	99.99	18.9	2	3.2	-.7	-1.0	1000.	-5.	20.3	.568	.568	0.	549	421.8
548.97	3.787	6.6	-4.84	13.60	99.99	18.9	1	2.1	-.8	-1.0	1000.	-5.	20.3	.628	.628	0.	550	414.4
549.97	3.789	3.3	-4.84	6.80	99.99	18.9	1	1.0	-.4	-1.0	1000.	-5.	20.3	.314	.314	0.	551	416.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
550.97	3.789	0.0	-4.84	0.00	11.44	18.9	1	0.0	.0	.3	1000.	2.	20.3	-.000	-.000	4.	552	417.1
551.97	3.789	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	553	0.0
552.97	3.789	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	554	0.0
553.97	3.789	0.0	0.00	0.00	11.44	18.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	555	0.0
554.97	3.789	0.0	0.00	0.00	11.44	18.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	556	0.0
555.97	3.789	0.0	0.00	0.00	11.44	18.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	557	0.0
556.97	3.789	0.0	0.00	0.00	11.44	18.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	558	0.0
557.97	3.789	0.0	0.00	0.00	11.44	18.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	559	0.0
558.97	3.789	0.0	0.00	0.00	11.44	18.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	560	0.0
559.97	3.789	0.0	0.00	0.00	11.44	18.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	561	0.0
560.97	3.789	0.0	0.00	0.00	11.44	18.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	562	0.0
561.97	3.789	0.0	0.00	0.00	11.44	18.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	563	0.0
562.97	3.789	0.0	0.00	0.00	11.44	18.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	564	0.0
563.97	3.789	0.0	0.00	0.00	11.44	18.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	565	0.0
564.97	3.789	0.0	0.00	0.00	11.44	18.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	566	0.0
565.97	3.789	0.0	0.00	0.00	11.44	18.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	567	0.0
566.97	3.789	0.0	0.00	0.00	11.44	18.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	568	0.0
567.98	3.789	3.3	4.84	2.84	.57	18.6	1	.4	5.7	12.1	1000.	64.	13.1	.314	.509	37.	569	0.0
568.98	3.791	6.6	4.84	4.39	.55	18.6	1	.9	11.4	16.2	1081.	79.	9.7	.581	.802	46.	570	0.0
569.98	3.793	9.9	4.84	4.84	.55	18.6	1	1.3	17.1	22.1	1284.	90.	7.3	.734	.885	54.	571	0.0
570.98	3.796	13.0	4.55	5.44	.53	18.5	1	1.9	21.4	27.0	1459.	97.	6.5	.849	.904	57.	572	0.0
571.97	3.800	14.6	2.35	9.09	.57	18.5	2	2.2	13.3	16.9	1173.	75.	10.1	.715	.879	45.	573	0.0
572.97	3.804	16.0	2.05	10.16	.58	18.5	2	2.4	13.1	16.3	1189.	72.	10.8	.773	.896	43.	574	0.0
573.97	3.809	17.0	1.47	12.79	.60	18.5	2	2.7	10.8	13.3	1157.	60.	13.2	.843	.904	37.	575	0.0
574.97	3.814	17.0	0.00	25.81	1.22	18.5	2	2.7	2.7	3.2	1013.	17.	19.3	.963	.963	12.	576	0.0
575.97	3.818	17.0	0.00	25.81	1.22	18.5	2	2.7	2.7	3.2	1013.	17.	19.3	.963	.963	12.	577	0.0
576.98	3.823	17.5	.73	18.42	.67	18.5	2	2.8	6.9	8.5	1095.	41.	16.8	.918	.918	26.	578	0.0
577.99	3.828	17.7	.29	23.06	.85	18.5	2	2.8	4.5	5.4	1074.	27.	18.5	.946	.946	18.	579	0.0
578.99	3.833	17.7	0.00	25.94	1.19	18.5	2	2.8	2.8	3.4	1053.	17.	19.3	.965	.965	13.	580	0.0
580.01	3.838	17.5	-.29	27.20	2.58	18.5	2	2.8	1.1	1.5	1035.	8.	20.1	.970	.970	7.	581	0.0
581.01	3.843	17.0	-.73	35.03	99.99	18.5	2	2.8	-1.2	-1.0	1000.	-5.	20.3	.976	.976	0.	582	.8
581.99	3.847	16.9	-.15	26.76	1.66	18.5	2	2.6	1.8	2.3	1000.	12.	19.6	.970	.970	9.	583	0.0
582.99	3.852	16.6	-.44	28.09	6.89	18.5	2	2.6	.2	.5	1000.	3.	20.3	.953	.953	4.	584	0.0
584.00	3.857	17.0	.59	19.86	.71	18.5	2	2.7	5.9	7.3	1058.	36.	17.5	.923	.923	23.	585	0.0
584.98	3.861	17.1	.15	24.36	.99	18.5	2	2.7	3.5	4.3	1029.	22.	18.9	.954	.954	15.	586	0.0
585.95	3.866	17.0	-.15	26.79	1.67	18.6	2	2.7	1.8	2.3	1006.	12.	19.7	.970	.970	9.	587	0.0
586.95	3.871	16.6	-.59	31.18	99.99	18.6	2	2.6	-.6	-.3	1000.	-2.	20.3	.953	.953	2.	588	0.0
587.93	3.875	16.5	-.15	26.14	1.67	18.6	2	2.5	1.7	2.3	1000.	12.	19.6	.947	.947	9.	589	0.0
588.93	3.880	16.5	0.00	25.38	1.23	18.6	2	2.5	2.5	3.2	1000.	17.	19.3	.947	.947	12.	590	0.0
589.90	3.884	16.6	.15	24.24	1.00	18.6	2	2.6	3.4	4.1	1002.	21.	18.9	.951	.951	14.	591	0.0
590.90	3.889	17.0	.59	19.86	.71	18.6	2	2.7	5.9	7.3	1058.	36.	17.5	.923	.923	23.	592	0.0
591.90	3.894	17.6	.88	17.03	.64	18.6	2	2.8	7.8	9.6	1113.	45.	16.1	.903	.903	29.	593	0.0
592.90	3.899	18.5	1.32	13.58	.60	18.6	2	3.0	10.9	13.5	1196.	59.	13.3	.889	.889	37.	594	0.0
593.89	3.904	19.2	1.03	15.63	.62	18.6	2	3.1	9.6	11.8	1207.	51.	14.7	.913	.913	33.	595	0.0
594.89	3.909	20.2	1.47	12.45	.60	18.5	2	3.4	13.0	16.2	1290.	66.	11.7	.899	.899	41.	596	0.0
595.90	3.915	21.0	1.17	14.41	.62	18.5	2	3.6	11.6	14.1	1310.	57.	13.4	.920	.920	36.	597	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
596.56	3.919	21.1	.15	27.08	.74	18.5	3	3.6	4.6	6.3	1000.	33.	17.9	.797	.802	21.	598	0.0
597.54	3.925	21.2	.15	27.17	.74	18.6	3	3.6	4.7	6.3	1000.	33.	17.9	.801	.804	21.	599	0.0
598.53	3.931	21.6	.59	22.01	.62	18.6	3	3.7	7.9	9.4	1014.	49.	15.8	.804	.901	29.	600	0.0
599.53	3.937	22.0	.59	22.00	.62	18.6	3	3.8	8.0	9.7	1025.	49.	15.7	.811	.902	30.	601	0.0
600.52	3.943	22.4	.59	21.98	.62	18.6	3	3.9	8.2	9.9	1036.	50.	15.5	.817	.902	30.	602	0.0
601.50	3.949	22.5	.15	28.54	.72	18.6	3	4.0	5.1	6.5	1000.	34.	17.8	.850	.850	21.	603	0.0
602.50	3.955	22.5	0.00	30.95	.84	18.6	3	4.0	4.0	5.2	1000.	27.	18.4	.850	.850	17.	604	0.0
603.50	3.961	22.5	0.00	30.95	.84	18.6	3	4.0	4.0	5.2	1000.	27.	18.4	.850	.850	17.	605	0.0
604.51	3.968	22.7	.29	26.48	.68	18.6	3	4.0	6.2	7.6	1000.	40.	17.1	.857	.880	24.	606	0.0
605.58	3.975	23.7	1.47	12.74	.58	18.6	2	4.3	15.6	19.0	1473.	68.	11.0	.924	.924	43.	607	0.0
606.59	3.981	25.1	2.05	10.63	.54	18.6	2	4.7	21.5	26.2	1578.	87.	7.8	.913	.913	53.	608	0.0
607.55	3.988	26.0	1.32	14.13	.57	18.6	3	5.0	16.1	19.4	1266.	80.	9.0	.775	.897	48.	609	0.0
608.55	3.996	26.5	.73	19.40	.60	18.6	3	5.1	11.4	13.6	1176.	61.	13.0	.851	.904	37.	610	0.0
609.56	4.003	27.0	.73	19.30	.60	18.6	3	5.3	11.7	14.0	1190.	62.	12.8	.857	.904	38.	611	0.0
610.56	4.010	26.1	-1.32	53.78	99.99	18.6	3	5.8	-1.2	-1.0	1000.	-5.	20.3	.986	.986	0.	612	57.1
611.56	4.017	22.3	-5.57	45.95	99.99	18.6	3	8.6	-1.0	-1.0	1000.	-5.	20.3	.842	.842	0.	613	489.6
612.56	4.023	19.5	-4.11	40.18	99.99	18.6	3	6.2	-.9	-1.0	1000.	-5.	20.3	.736	.736	0.	614	346.1
613.57	4.028	16.2	-4.84	33.38	99.99	18.6	2	5.5	-1.1	-1.0	1000.	-5.	20.3	.930	.930	0.	615	416.5
614.57	4.032	12.9	-4.84	26.58	99.99	18.6	2	4.2	-.9	-1.0	1000.	-5.	20.3	.741	.741	0.	616	419.5
615.57	4.035	9.6	-4.84	19.78	99.99	18.6	2	3.1	-.7	-1.0	1000.	-5.	20.3	.551	.551	0.	617	420.0
616.58	4.037	6.3	-4.84	12.98	99.99	18.6	1	2.0	-.7	-1.0	1000.	-5.	20.3	.600	.600	0.	618	414.5
617.58	4.039	3.0	-4.84	6.18	99.99	18.6	1	.9	-.3	-1.0	1000.	-5.	20.3	.286	.286	0.	619	416.1
618.58	4.039	0.0	-4.40	0.00	11.44	18.6	1	0.0	.0	.3	1000.	2.	20.3	-.000	-.000	4.	620	372.1
619.58	4.039	0.0	0.00	0.00	11.44	18.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	621	0.0
620.58	4.039	0.0	0.00	0.00	11.44	18.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	622	0.0
621.58	4.039	0.0	0.00	0.00	11.44	18.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	623	0.0
622.58	4.039	0.0	0.00	0.00	11.44	18.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	624	0.0
623.58	4.039	0.0	0.00	0.00	11.44	18.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	625	0.0
624.58	4.039	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	626	0.0
625.58	4.039	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	627	0.0
626.58	4.039	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	628	0.0
627.58	4.039	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	629	0.0
628.58	4.039	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	630	0.0
629.58	4.039	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	631	0.0
630.58	4.039	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	632	0.0
631.58	4.039	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	633	0.0
632.58	4.039	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	634	0.0
633.58	4.039	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	635	0.0
634.58	4.039	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	636	0.0
635.58	4.039	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	637	0.0
636.58	4.039	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	638	0.0
637.58	4.039	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	639	0.0
638.58	4.039	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	640	0.0
639.58	4.039	0.0	0.00	0.00	11.44	18.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	641	0.0
640.58	4.039	0.0	0.00	0.00	11.44	18.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	642	0.0
641.58	4.039	0.0	0.00	0.00	11.44	18.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	643	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
642.58	4.039	0.0	0.00	0.00	11.44	18.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	644	0.0
643.58	4.039	0.0	0.00	0.00	11.44	18.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	645	0.0
644.58	4.039	2.0	2.93	2.35	.68	18.3	1	.2	2.2	7.5	1000.	39.	17.2	.190	.322	24.	646	0.0
645.58	4.040	4.5	3.67	4.35	.60	18.3	1	.6	6.0	10.4	1000.	55.	14.9	.428	.634	32.	647	0.0
646.58	4.042	7.8	4.84	4.59	.55	18.2	1	1.0	13.5	18.4	1153.	84.	8.5	.644	.844	49.	648	0.0
647.58	4.045	10.2	3.52	6.28	.58	18.2	1	1.4	13.2	16.8	1212.	73.	10.6	.801	.901	44.	649	0.0
648.58	4.048	12.5	3.37	6.57	.57	18.2	1	1.8	15.7	19.9	1345.	78.	9.4	.885	.901	47.	650	0.0
649.56	4.051	14.0	2.20	9.52	.57	18.2	2	2.1	12.1	15.3	1132.	71.	11.2	.710	.877	42.	651	0.0
650.56	4.055	15.3	1.91	10.72	.58	18.2	2	2.3	11.8	14.7	1146.	67.	11.9	.767	.895	40.	652	0.0
651.57	4.060	17.5	3.23	7.46	.53	18.1	2	2.8	21.2	26.5	1376.	101.	5.8	.730	.884	59.	653	0.0
652.57	4.065	19.6	3.08	7.98	.52	18.1	2	3.2	22.9	28.2	1439.	103.	5.7	.782	.898	60.	654	0.0
653.57	4.071	21.0	2.05	10.36	.56	18.1	2	3.6	17.6	21.6	1385.	82.	8.6	.870	.903	50.	655	0.0
654.57	4.077	22.2	1.76	11.34	.57	18.1	2	3.9	16.6	20.5	1412.	76.	9.6	.903	.903	47.	656	0.0
655.57	4.083	23.3	1.61	12.07	.58	18.0	2	4.2	16.4	20.0	1458.	72.	10.3	.917	.917	45.	657	0.0
656.57	4.090	24.5	1.76	11.58	.56	18.0	2	4.5	18.6	22.5	1529.	77.	9.3	.920	.920	48.	658	0.0
657.53	4.096	25.3	1.17	15.19	.58	18.0	3	4.8	14.4	17.3	1223.	74.	10.3	.781	.898	45.	659	0.0
658.53	4.103	25.6	.44	24.12	.63	18.0	3	4.9	8.5	10.1	1091.	49.	15.6	.886	.900	30.	660	0.0
659.53	4.111	26.0	.59	21.48	.61	18.0	3	5.0	10.0	11.9	1135.	55.	14.3	.865	.904	34.	661	0.0
660.51	4.118	26.1	.15	29.90	.70	18.1	3	5.0	6.3	7.5	1069.	37.	17.4	.922	.922	23.	662	0.0
661.48	4.125	26.2	.15	29.88	.70	18.1	3	5.0	6.3	7.5	1073.	37.	17.4	.922	.922	23.	663	0.0
662.48	4.132	26.2	0.00	33.39	.79	18.1	3	5.0	5.0	5.9	1054.	30.	18.2	.938	.938	19.	664	0.0
663.49	4.139	26.4	.29	26.66	.65	18.1	3	5.1	7.6	9.1	1097.	44.	16.5	.909	.909	27.	665	0.0
664.47	4.147	26.5	.15	29.82	.70	18.1	3	5.1	6.4	7.6	1084.	37.	17.4	.923	.923	24.	666	0.0
665.47	4.154	26.5	0.00	33.38	.79	18.1	3	5.1	5.1	6.0	1065.	30.	18.2	.940	.940	20.	667	0.0
666.48	4.161	26.0	-.73	52.32	99.99	18.1	3	5.1	-1.1	-.8	1000.	-4.	20.3	.982	.982	0.	668	0.0
667.48	4.168	25.5	-.73	51.71	99.99	18.2	3	5.0	-1.1	-.9	1000.	-5.	20.3	.963	.963	0.	669	0.0
668.48	4.175	23.6	-2.79	48.63	99.99	18.2	3	6.5	-1.1	-1.0	1000.	-5.	20.3	.891	.891	0.	670	208.3
669.48	4.182	21.4	-3.23	44.10	99.99	18.2	3	6.1	-1.0	-1.0	1000.	-5.	20.3	.808	.808	0.	671	255.3
670.48	4.187	18.5	-4.25	38.12	99.99	18.2	3	5.9	-.9	-1.0	1000.	-5.	20.3	.699	.699	0.	672	361.3
671.50	4.192	16.4	-3.08	33.80	99.99	18.2	2	4.3	-1.1	-1.0	1000.	-5.	20.3	.941	.941	0.	673	238.6
672.50	4.196	14.5	-2.79	29.88	99.99	18.2	2	3.6	-1.0	-1.0	1000.	-5.	20.3	.832	.832	0.	674	211.2
673.50	4.200	11.6	-4.25	23.90	99.99	18.2	2	3.5	-.8	-1.0	1000.	-5.	20.3	.666	.666	0.	675	361.0
674.50	4.203	8.7	-4.25	17.93	99.99	18.2	2	2.6	-.6	-1.0	1000.	-5.	20.3	.499	.499	0.	676	363.1
675.51	4.205	5.8	-4.25	11.95	99.99	18.2	1	1.7	-.7	-1.0	1000.	-5.	20.3	.552	.552	0.	677	354.4
676.51	4.206	3.5	-3.37	7.21	99.99	18.2	1	.9	-.4	-1.0	1000.	-5.	20.3	.333	.333	0.	678	265.4
677.51	4.207	2.0	-2.20	4.12	99.99	18.2	1	.4	-.2	-1.0	1000.	-5.	20.3	.190	.190	0.	679	146.3
678.51	4.207	0.0	-2.93	0.00	11.44	18.2	1	0.0	.0	.3	1000.	2.	20.3	-.000	-.000	4.	680	221.6
679.51	4.207	0.0	0.00	0.00	11.44	18.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	681	0.0
680.51	4.207	0.0	0.00	0.00	11.44	18.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	682	0.0
681.51	4.207	0.0	0.00	0.00	11.44	18.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	683	0.0
682.51	4.207	0.0	0.00	0.00	11.44	18.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	684	0.0
683.51	4.207	0.0	0.00	0.00	11.44	18.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	685	0.0
684.51	4.207	0.0	0.00	0.00	11.44	18.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	686	0.0
685.51	4.207	0.0	0.00	0.00	11.44	18.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	687	0.0
686.51	4.207	0.0	0.00	0.00	11.44	18.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	688	0.0
687.51	4.207	0.0	0.00	0.00	11.44	18.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	689	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
688.51	4.207	0.0	0.00	0.00	11.44	18.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	690	0.0
689.51	4.207	0.0	0.00	0.00	11.44	18.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	691	0.0
690.51	4.207	0.0	0.00	0.00	11.44	18.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	692	0.0
691.51	4.207	0.0	0.00	0.00	11.44	18.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	693	0.0
692.51	4.207	1.4	2.05	1.90	.81	18.0	1	.2	1.1	5.4	1000.	28.	18.3	.133	.232	18.	694	0.0
693.51	4.208	3.3	2.79	3.78	.67	18.0	1	.4	3.4	7.9	1000.	41.	17.0	.314	.485	25.	695	0.0
694.51	4.209	4.4	1.61	5.84	.78	18.0	1	.6	2.9	5.7	1000.	30.	18.2	.419	.563	19.	696	0.0
695.51	4.211	6.5	3.08	6.39	.60	18.0	1	.8	7.4	10.1	1000.	53.	15.2	.619	.805	32.	697	0.0
696.51	4.213	9.2	3.96	5.67	.57	18.0	1	1.2	13.2	17.0	1181.	76.	10.1	.741	.888	45.	698	0.0
697.51	4.216	11.3	3.08	6.97	.59	18.0	1	1.6	13.0	16.5	1247.	69.	11.2	.862	.904	42.	699	0.0
698.51	4.219	13.5	3.23	6.82	.57	17.9	1	2.0	16.3	20.8	1417.	77.	9.4	.906	.906	47.	700	0.0
699.47	4.223	14.6	1.61	12.08	.59	17.9	2	2.2	9.8	12.2	1081.	59.	13.7	.775	.897	36.	701	0.0
700.48	4.227	16.4	2.64	8.44	.56	17.9	2	2.5	16.6	20.8	1273.	66.	8.1	.739	.887	51.	702	0.0
701.48	4.232	16.7	.44	21.42	.77	17.9	2	2.6	5.0	6.0	1031.	31.	18.1	.930	.930	20.	703	0.0
702.49	4.236	16.5	-.29	26.46	2.64	17.9	2	2.5	1.0	1.4	1000.	7.	20.1	.947	.947	7.	704	0.0
703.49	4.241	16.5	0.00	25.38	1.23	17.9	2	2.5	2.5	3.2	1000.	17.	19.3	.947	.947	12.	705	0.0
704.56	4.246	18.2	2.49	8.94	.56	17.9	2	2.9	17.7	21.8	1325.	86.	7.9	.788	.899	52.	706	0.0
705.56	4.251	19.2	1.47	12.59	.60	17.9	2	3.1	12.3	15.2	1243.	64.	12.1	.887	.900	40.	707	0.0
706.56	4.257	20.1	1.32	13.38	.61	17.9	2	3.4	12.0	14.8	1275.	61.	12.7	.905	.905	38.	708	0.0
707.56	4.263	21.5	2.05	10.39	.56	17.9	2	3.7	18.1	22.2	1404.	83.	8.5	.879	.903	50.	709	0.0
708.56	4.269	22.5	1.47	12.67	.59	17.8	2	4.0	14.7	18.0	1408.	67.	11.2	.917	.917	42.	710	0.0
709.56	4.275	22.5	0.00	30.95	.84	17.9	3	4.0	4.0	5.2	1000.	27.	18.4	.850	.850	17.	711	0.0
710.55	4.281	22.1	-.59	40.50	99.99	17.9	3	3.9	-.3	-.1	1000.	-1.	20.3	.835	.835	2.	712	0.0
711.60	4.288	22.7	.88	18.14	.59	17.9	3	4.0	10.5	12.6	1100.	60.	13.4	.779	.897	36.	713	0.0
712.60	4.294	23.3	.88	18.19	.59	17.9	3	4.2	10.8	12.9	1118.	61.	13.3	.787	.899	37.	714	0.0
713.62	4.301	23.5	.29	26.99	.67	17.9	3	4.2	6.5	7.8	1000.	41.	17.0	.888	.896	25.	715	0.0
714.61	4.307	22.5	-1.47	46.37	99.99	17.9	3	4.8	-1.1	-1.0	1000.	-5.	20.3	.850	.850	0.	716	76.9
715.61	4.313	21.6	-1.32	44.51	99.99	17.9	3	4.4	-1.0	-1.0	1000.	-5.	20.3	.816	.816	0.	717	63.0
716.61	4.319	20.5	-1.61	42.24	99.99	17.9	3	4.4	-1.0	-1.0	1000.	-5.	20.3	.774	.774	0.	718	93.4
717.61	4.324	18.0	-3.67	37.09	99.99	17.9	3	5.3	-.8	-1.0	1000.	-5.	20.3	.680	.680	0.	719	303.4
718.63	4.329	15.0	-4.40	30.91	99.99	17.9	2	4.7	-1.0	-1.0	1000.	-5.	20.3	.861	.861	0.	720	373.2
719.63	4.333	12.0	-4.40	24.73	99.99	18.0	2	3.7	-.8	-1.0	1000.	-5.	20.3	.689	.689	0.	721	375.8
720.63	4.336	9.0	-4.40	18.55	99.99	18.0	2	2.7	-.6	-1.0	1000.	-5.	20.3	.517	.517	0.	722	378.0
721.64	4.338	6.2	-4.11	12.78	99.99	18.0	1	1.8	-.7	-1.0	1000.	-5.	20.3	.590	.590	0.	723	339.9
722.64	4.339	4.5	-2.49	9.27	99.99	18.0	1	1.0	-.5	-1.0	1000.	-5.	20.3	.428	.428	0.	724	174.9
723.64	4.340	3.0	-2.20	6.18	99.99	17.9	1	.6	-.3	-1.0	1000.	-5.	20.3	.286	.286	0.	725	145.9
724.64	4.341	2.1	-1.32	4.33	99.99	17.9	1	.3	-.2	-1.0	1000.	-5.	20.3	.200	.200	0.	726	56.2
725.64	4.341	.5	-2.35	1.03	99.99	17.9	1	.1	-.1	-1.0	1000.	-5.	20.3	.048	.048	0.	727	162.1
726.64	4.341	.5	0.00	.81	3.47	17.9	1	.1	.1	1.1	1000.	6.	20.2	.048	.084	6.	728	0.0
727.64	4.342	3.2	3.96	3.12	.60	17.9	1	.4	4.6	10.3	1000.	54.	15.0	.305	.488	32.	729	0.0
728.64	4.343	6.5	4.84	4.36	.55	17.9	1	.8	11.2	16.1	1076.	78.	9.7	.575	.797	46.	730	0.0
729.64	4.345	9.6	4.55	5.07	.56	17.9	1	1.3	15.7	20.3	1246.	85.	8.1	.733	.885	51.	731	0.0
730.64	4.349	12.5	4.25	5.64	.54	17.8	1	1.8	19.3	24.4	1406.	91.	7.3	.846	.904	54.	732	0.0
731.63	4.352	14.0	2.20	9.52	.57	17.8	2	2.1	12.1	15.3	1132.	71.	11.2	.710	.877	42.	733	0.0
732.63	4.356	16.0	2.93	7.75	.55	17.8	2	2.4	17.7	22.4	1288.	91.	7.2	.713	.878	54.	734	0.0
733.63	4.361	18.0	2.93	8.03	.54	17.8	2	2.9	20.0	24.8	1363.	96.	6.6	.758	.893	57.	735	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.HOT	SEG	BRAKES
734.63	4.366	19.6	2.35	9.43	.56	17.7	2	3.2	18.2	22.4	1365.	86.	8.0	.824	.903	52.	736	0.0
735.63	4.372	21.5	2.79	8.66	.52	17.7	2	3.7	23.2	28.5	1485.	101.	6.0	.831	.903	59.	737	0.0
736.63	4.378	23.1	2.35	9.67	.53	17.7	2	4.1	21.8	26.8	1500.	94.	6.9	.884	.902	56.	738	0.0
737.63	4.385	24.5	2.05	10.57	.54	17.7	2	4.5	20.9	25.6	1548.	87.	7.8	.909	.909	52.	739	0.0
738.60	4.392	25.5	1.47	13.22	.56	17.7	3	4.8	17.0	20.5	1279.	84.	8.3	.753	.891	50.	740	0.0
739.60	4.399	26.5	1.47	13.24	.56	17.7	3	5.1	17.8	21.4	1304.	86.	8.0	.767	.895	52.	741	0.0
740.60	4.406	27.1	.88	17.70	.59	17.7	3	5.3	13.1	15.5	1221.	67.	11.8	.838	.903	41.	742	0.0
741.60	4.414	27.6	.73	19.18	.60	17.7	3	5.5	12.0	14.4	1207.	63.	12.6	.864	.904	38.	743	0.0
742.60	4.422	27.9	.44	23.49	.62	17.7	3	5.6	9.6	11.4	1167.	52.	14.8	.903	.903	32.	744	0.0
743.60	4.429	28.3	.59	20.83	.60	17.7	3	5.7	11.1	13.4	1199.	59.	13.3	.892	.897	36.	745	0.0
744.60	4.437	28.6	.44	23.33	.62	17.7	3	5.8	9.9	11.8	1192.	52.	14.6	.906	.906	33.	746	0.0
745.60	4.445	28.6	0.00	33.05	.76	17.7	3	5.8	5.8	6.8	1144.	31.	18.0	.944	.944	21.	747	0.0
746.60	4.453	28.3	-.44	41.35	1.93	17.7	3	5.7	1.7	2.1	1102.	10.	20.0	.970	.970	10.	748	0.0
747.57	4.461	28.2	-.15	36.78	.91	17.7	3	5.7	4.3	5.1	1113.	24.	18.8	.957	.957	17.	749	0.0
748.59	4.469	28.0	-.29	39.77	1.19	17.8	3	5.6	3.0	3.5	1092.	17.	19.4	.968	.968	13.	750	0.0
749.59	4.476	27.5	-.73	54.07	99.99	17.8	3	5.6	-1.0	-.7	1000.	-3.	20.3	1.039	.963	1.	751	0.0
750.59	4.484	26.8	-1.03	55.23	99.99	17.8	3	5.7	-1.3	-1.0	1000.	-5.	20.3	1.012	.958	0.	752	26.9
751.58	4.491	25.5	-1.91	52.55	99.99	17.8	3	6.2	-1.2	-1.0	1000.	-5.	20.3	.963	.963	0.	753	117.3
752.59	4.498	23.5	-2.93	48.43	99.99	17.8	3	6.6	-1.1	-1.0	1000.	-5.	20.3	.888	.888	0.	754	222.5
753.59	4.504	21.5	-2.93	44.30	99.99	17.8	3	5.9	-1.0	-1.0	1000.	-5.	20.3	.812	.812	0.	755	225.0
754.59	4.510	19.0	-3.67	39.15	99.99	17.9	3	5.6	-.9	-1.0	1000.	-5.	20.3	.718	.718	0.	756	302.4
755.60	4.515	16.5	-3.67	34.00	99.99	17.9	2	4.8	-1.2	-1.0	1000.	-5.	20.3	.947	.947	0.	757	298.1
756.60	4.519	14.9	-2.35	30.70	99.99	17.9	2	3.4	-1.0	-1.0	1000.	-5.	20.3	.855	.855	0.	758	166.4
757.60	4.523	12.5	-3.52	25.76	99.99	17.9	2	3.4	-.9	-1.0	1000.	-5.	20.3	.718	.718	0.	759	286.6
758.60	4.526	9.4	-4.55	19.37	99.99	17.9	2	2.9	-.7	-1.0	1000.	-5.	20.3	.540	.540	0.	760	392.9
759.61	4.528	6.2	-4.69	12.78	99.99	17.9	1	1.9	-.7	-1.0	1000.	-5.	20.3	.540	.540	0.	761	399.2
760.61	4.529	3.0	-4.69	6.18	99.99	17.9	1	.9	-.3	-1.0	1000.	-5.	20.3	.286	.286	0.	762	400.8
761.61	4.530	1.5	-2.20	3.09	99.99	17.9	1	.3	-.2	-1.0	1000.	-5.	20.3	.143	.143	0.	763	146.5
762.61	4.531	1.5	0.00	2.41	2.99	17.9	1	.2	.2	1.2	1000.	7.	20.1	.143	.206	6.	764	0.0
763.61	4.531	.5	-1.47	1.03	99.99	17.9	1	.1	-.1	-1.0	1000.	-5.	20.3	.048	.048	0.	765	72.1
764.61	4.531	0.0	-.73	0.00	11.44	17.8	1	0.0	.0	.3	1000.	2.	20.3	-.000	-.000	4.	766	0.0
765.62	4.531	3.0	4.40	2.77	.59	17.8	1	.4	4.7	11.0	1000.	58.	14.2	.286	.467	34.	767	0.0
766.62	4.533	6.3	4.84	4.31	.55	17.8	1	.8	10.9	15.8	1064.	78.	9.9	.563	.788	45.	768	0.0
767.62	4.535	9.6	4.84	4.81	.55	17.8	1	1.3	16.6	21.6	1265.	89.	7.5	.722	.881	53.	769	0.0
768.62	4.538	12.9	4.84	5.24	.52	17.8	1	1.9	22.4	29.2	1470.	101.	6.0	.835	.903	59.	770	0.0
769.62	4.542	15.8	4.25	5.92	.51	17.7	1	2.4	24.5	31.0	1648.	99.	6.5	.912	.912	58.	771	0.0
770.59	4.546	17.5	2.49	8.87	.56	17.7	2	2.8	17.0	21.0	1296.	85.	8.2	.775	.897	51.	772	0.0
771.59	4.551	18.4	1.32	13.60	.60	17.7	2	3.0	10.9	13.4	1192.	59.	13.3	.886	.900	36.	773	0.0
772.59	4.557	19.5	1.61	11.90	.59	17.7	2	3.2	13.4	16.5	1273.	68.	11.3	.880	.903	42.	774	0.0
773.59	4.562	20.7	1.76	11.26	.58	17.7	2	3.5	15.4	18.9	1339.	74.	10.0	.888	.900	45.	775	0.0
774.59	4.568	22.0	1.91	10.76	.56	17.7	2	3.8	17.5	21.8	1410.	81.	8.7	.896	.896	49.	776	0.0
775.59	4.574	23.2	1.76	11.45	.57	17.6	2	4.2	17.5	21.4	1463.	77.	9.5	.910	.910	47.	777	0.0
776.59	4.581	25.0	2.64	9.18	.50	17.6	2	4.7	26.2	32.3	1606.	106.	5.6	.893	.896	62.	778	0.0
777.59	4.588	26.5	2.20	10.31	.52	17.6	2	5.1	24.1	29.3	1659.	93.	7.2	.917	.917	55.	779	0.0
778.55	4.596	27.5	1.47	13.30	.55	17.6	3	5.5	18.6	22.3	1331.	83.	7.7	.780	.898	53.	780	0.0
779.56	4.603	28.0	.73	19.10	.60	17.6	3	5.6	12.3	14.7	1218.	63.	12.4	.868	.904	39.	781	0.0

VEHICLE PERFORMANCE SIMULATION

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
780.56	4.611	28.3	.44	23.41	.62	17.6	3	5.7	9.8	11.7	1181.	52.	14.7	.905	.905	33.	782	0.0
781.56	4.619	28.9	.88	17.31	.59	17.6	3	5.9	14.2	16.9	1271.	70.	11.0	.859	.904	43.	783	0.0
782.56	4.627	28.9	0.00	32.98	.75	17.6	3	5.9	5.9	6.9	1156.	32.	18.0	.944	.944	22.	784	0.0
783.56	4.635	28.9	0.00	32.98	.75	17.6	3	5.9	5.9	6.9	1156.	32.	18.0	.944	.944	22.	785	0.0
784.54	4.643	28.8	-.15	36.75	.89	17.6	3	5.9	4.5	5.3	1136.	24.	18.8	.958	.958	18.	786	0.0
785.54	4.651	28.5	-.44	41.36	1.90	17.7	3	5.8	1.7	2.2	1109.	10.	20.0	.970	.970	10.	787	0.0
786.55	4.659	28.3	-.29	39.75	1.17	17.7	3	5.7	3.1	3.6	1104.	17.	19.4	.968	.968	13.	788	0.0
787.55	4.667	28.3	0.00	33.11	.76	17.7	3	5.7	5.7	6.7	1133.	31.	18.0	.943	.943	21.	789	0.0
788.55	4.675	28.3	0.00	33.11	.76	17.7	3	5.7	5.7	6.7	1133.	31.	18.0	.943	.943	21.	790	0.0
789.53	4.682	28.2	-.15	36.78	.91	17.7	3	5.7	4.3	5.1	1113.	24.	18.8	.957	.957	17.	791	0.0
790.53	4.690	27.6	-.88	56.87	99.99	17.7	3	5.8	-1.3	-1.0	1000.	-5.	20.3	1.042	.959	0.	792	10.7
791.35	4.696	27.5	-.15	36.79	.92	17.8	3	5.5	4.1	4.8	1087.	23.	18.9	.955	.955	16.	793	0.0
792.35	4.704	27.5	0.00	33.25	.77	17.8	3	5.5	5.5	6.4	1103.	30.	18.1	.942	.942	20.	794	0.0
793.35	4.712	27.5	0.00	33.25	.77	17.8	3	5.5	5.5	6.4	1103.	30.	18.1	.942	.942	20.	795	0.0
794.35	4.719	27.5	0.00	33.25	.77	17.8	3	5.5	5.5	6.4	1103.	30.	18.1	.942	.942	20.	796	0.0
795.35	4.727	27.5	0.00	33.25	.77	17.8	3	5.5	5.5	6.4	1103.	30.	18.1	.942	.942	20.	797	0.0
796.35	4.735	27.5	0.00	33.25	.77	17.8	3	5.5	5.5	6.4	1103.	30.	18.1	.942	.942	20.	798	0.0
797.33	4.742	27.6	.15	29.58	.69	17.8	3	5.5	6.8	8.1	1125.	38.	17.2	.927	.927	25.	799	0.0
798.33	4.750	28.0	.59	20.94	.60	17.8	3	5.6	11.0	13.2	1190.	58.	13.5	.889	.899	36.	800	0.0
799.34	4.758	28.5	.73	19.00	.60	17.8	3	5.8	12.5	15.0	1232.	64.	12.2	.874	.903	39.	801	0.0
800.47	4.767	30.0	2.20	10.59	.51	17.8	2	6.3	27.8	33.3	1846.	95.	7.4	.933	.933	57.	802	0.0
801.42	4.775	31.0	1.47	13.47	.54	17.8	3	6.7	21.5	25.6	1429.	94.	6.8	.820	.902	56.	803	0.0
802.42	4.784	32.0	1.47	13.51	.53	17.8	3	7.1	22.4	26.6	1455.	96.	6.6	.831	.903	57.	804	0.0
803.41	4.793	33.0	1.47	13.55	.53	17.8	3	7.5	23.2	27.6	1482.	98.	6.4	.841	.903	58.	805	0.0
804.41	4.802	33.0	0.00	31.89	.71	17.8	3	7.5	7.5	8.7	1308.	35.	17.4	.953	.953	25.	806	0.0
805.44	4.811	33.6	.88	16.98	.57	17.8	3	7.7	17.3	20.8	1410.	77.	9.4	.900	.900	47.	807	0.0
806.43	4.821	34.0	.59	19.98	.60	17.8	3	7.9	14.4	17.0	1396.	64.	11.8	.920	.920	40.	808	0.0
807.43	4.830	34.3	.44	22.14	.61	17.8	3	8.0	12.9	15.1	1397.	57.	13.1	.928	.928	37.	809	0.0
808.41	4.839	34.2	-.15	35.13	.79	17.8	3	8.0	6.3	7.4	1341.	29.	18.3	.963	.963	22.	810	0.0
809.42	4.849	34.0	-.29	38.74	.94	17.8	3	7.9	4.7	5.6	1323.	22.	19.2	.970	.970	18.	811	0.0
810.42	4.859	34.0	0.00	31.40	.70	17.9	3	7.9	7.9	9.2	1345.	36.	17.2	.954	.954	26.	812	0.0
811.40	4.868	33.9	-.15	35.29	.79	17.9	3	7.9	6.2	7.2	1330.	29.	18.3	.963	.963	22.	813	0.0
812.40	4.877	33.6	-.44	41.66	1.33	17.9	3	7.7	2.9	3.6	1305.	15.	20.1	.970	.970	14.	814	0.0
813.40	4.886	33.1	-.73	59.42	108.34	17.9	3	7.5	-.3	.0	1000.	0.	20.3	1.050	.800	3.	815	0.0
813.50	4.887	33.0	-3.22	10.30	.47	17.9	2	10.9	-23.6	40.4	1747.	100.	4.4	1.083	.923	69.	816	9.0
814.60	4.897	32.5	-.73	58.93	99.99	17.9	3	7.3	-.4	-.0	1000.	-0.	20.3	1.227	.815	3.	817	0.0
815.61	4.906	32.0	-.73	58.51	99.99	18.0	3	7.1	-.5	-.1	1000.	-1.	20.3	1.209	.827	2.	818	0.0
816.41	4.913	31.9	-.15	36.09	.82	18.0	3	7.0	5.5	6.4	1254.	27.	18.6	.961	.961	20.	819	0.0
817.41	4.922	31.6	-.44	41.57	1.52	18.0	3	6.9	2.4	3.0	1230.	13.	20.1	.970	.970	13.	820	0.0
818.39	4.931	31.5	-.15	35.20	.83	18.0	3	6.9	5.3	6.3	1239.	27.	18.6	.961	.961	20.	821	0.0
819.39	4.939	30.6	-1.32	63.06	99.99	18.0	3	7.4	-1.4	-1.0	1000.	-5.	20.3	1.156	.865	0.	822	50.3
820.39	4.948	30.0	-.88	61.82	99.99	18.1	3	6.6	-1.4	-1.0	1000.	-5.	20.3	1.133	.883	0.	823	7.0
821.20	4.954	29.9	-.15	36.61	.86	18.1	3	6.3	4.8	5.7	1178.	25.	18.8	.959	.959	18.	824	0.0
822.20	4.963	29.9	0.00	32.77	.74	18.1	3	6.3	6.3	7.4	1193.	32.	17.9	.946	.946	22.	825	0.0
823.20	4.971	29.9	0.00	32.77	.74	18.1	3	6.3	6.3	7.4	1193.	32.	17.9	.946	.946	22.	826	0.0
824.20	4.979	29.9	0.00	32.77	.74	18.1	3	6.3	6.3	7.4	1193.	32.	17.9	.946	.946	22.	827	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
825.20	4.988	29.6	-.44	41.44	1.75	18.1	3	6.2	1.9	2.4	1152.	11.	20.0	.970	.970	11.	828	0.0
826.18	4.996	29.5	-.15	36.68	.87	18.1	3	6.1	4.7	5.5	1162.	25.	18.8	.959	.959	18.	829	0.0
827.18	5.004	29.5	0.00	32.85	.75	18.2	3	6.1	6.1	7.2	1178.	32.	17.9	.945	.945	22.	830	0.0
828.19	5.012	29.3	-.29	39.65	1.13	18.2	3	6.1	3.3	3.9	1142.	18.	19.4	.969	.969	14.	831	0.0
829.18	5.020	28.9	-.59	43.58	5.36	18.2	3	5.9	.4	.7	1125.	3.	20.5	.970	.970	6.	832	0.0
830.18	5.028	28.2	-1.03	58.11	99.99	18.2	3	6.1	-1.3	-1.0	1000.	-5.	20.3	1.065	.939	0.	833	24.9
831.18	5.036	27.7	-.73	54.29	99.99	18.2	3	5.6	-.9	-.6	1000.	-3.	20.3	1.046	.956	1.	834	0.0
832.18	5.043	27.0	-1.03	55.64	99.99	18.2	3	5.7	-1.3	-1.0	1000.	-5.	20.3	1.020	.981	0.	835	26.6
833.18	5.051	25.5	-2.20	52.55	99.99	18.3	3	6.5	-1.2	-1.0	1000.	-5.	20.3	.963	.963	0.	836	146.4
834.18	5.058	23.7	-2.64	48.84	99.99	18.3	3	6.4	-1.1	-1.0	1000.	-5.	20.3	.895	.895	0.	837	193.1
835.18	5.064	22.0	-2.49	45.33	99.99	18.3	3	5.6	-1.0	-1.0	1000.	-5.	20.3	.831	.831	0.	838	180.2
836.18	5.070	20.5	-2.20	42.24	99.99	18.3	3	4.9	-1.0	-1.0	1000.	-5.	20.3	.774	.774	0.	839	152.8
837.18	5.075	19.2	-1.91	39.57	99.99	18.3	3	4.3	-.9	-1.0	1000.	-5.	20.3	.725	.725	0.	840	125.1
838.18	5.081	19.2	0.00	26.99	.88	18.3	3	3.1	3.1	4.8	1000.	25.	18.6	.725	.725	16.	841	0.0
839.22	5.086	20.0	1.17	14.45	.61	18.3	2	3.3	11.0	13.5	1259.	56.	13.6	.912	.912	36.	842	0.0
840.22	5.092	20.9	1.32	13.39	.61	18.3	2	3.6	12.5	15.4	1316.	61.	12.5	.912	.912	39.	843	0.0
841.22	5.098	21.4	.73	18.40	.66	18.3	2	3.7	8.8	10.6	1304.	43.	16.1	.942	.942	29.	844	0.0
842.22	5.104	22.0	.88	16.94	.64	18.3	2	3.8	10.1	12.1	1344.	47.	15.1	.939	.939	32.	845	0.0
843.27	5.110	22.7	1.91	17.87	.63	18.3	3	4.0	18.1	12.0	1273.	49.	14.9	.672	.860	32.	846	0.0
844.16	5.116	23.2	.88	18.08	.59	18.3	3	4.2	10.8	13.0	1115.	61.	13.2	.786	.899	37.	847	0.0
845.17	5.123	24.0	1.17	15.26	.58	18.3	3	4.4	13.5	16.3	1188.	72.	10.8	.763	.894	43.	848	0.0
846.21	5.130	25.0	1.47	12.83	.58	18.3	2	4.7	16.6	20.1	1543.	68.	10.8	.930	.930	43.	849	0.0
847.21	5.137	26.0	1.47	12.90	.58	18.3	2	5.0	17.4	20.9	1595.	69.	10.6	.936	.936	44.	850	0.0
848.13	5.144	26.6	.88	17.66	.59	18.3	3	5.2	12.8	15.2	1208.	66.	11.9	.832	.903	40.	851	0.0
849.13	5.151	26.6	0.00	33.38	.78	18.3	3	5.2	5.2	6.1	1068.	30.	18.2	.940	.940	20.	852	0.0
850.14	5.158	26.8	.29	26.61	.65	18.3	3	5.2	7.7	9.3	1111.	44.	16.4	.911	.911	28.	853	0.0
851.15	5.166	27.0	.29	26.58	.65	18.3	3	5.3	7.8	9.4	1118.	44.	16.3	.912	.912	28.	854	0.0
852.16	5.174	27.2	.29	26.55	.65	18.3	3	5.4	7.9	9.4	1125.	44.	16.3	.913	.913	28.	855	0.0
853.18	5.181	27.8	.88	17.48	.59	18.3	3	5.6	13.5	16.1	1241.	68.	11.4	.846	.904	42.	856	0.0
854.18	5.189	28.1	.44	23.44	.62	18.3	3	5.7	9.7	11.6	1174.	52.	14.8	.904	.904	32.	857	0.0
855.19	5.197	28.8	1.03	16.00	.58	18.3	3	5.9	15.5	18.5	1294.	75.	9.9	.840	.903	46.	858	0.0
856.17	5.205	28.9	.15	29.30	.68	18.3	3	5.9	7.3	8.6	1172.	39.	17.0	.931	.931	26.	859	0.0
857.14	5.213	29.0	.15	29.27	.68	18.3	3	6.0	7.4	8.7	1175.	39.	17.0	.932	.932	26.	860	0.0
858.12	5.221	29.1	.15	29.25	.68	18.3	3	6.0	7.4	8.7	1179.	39.	16.9	.932	.932	26.	861	0.0
859.10	5.229	29.0	-.15	36.73	.88	18.4	3	6.0	4.5	5.3	1143.	24.	18.8	.958	.958	18.	862	0.0
860.10	5.237	28.1	-1.32	57.91	99.99	18.4	3	6.5	-1.3	-1.0	1000.	-5.	20.3	1.061	.942	0.	863	54.2
861.10	5.244	27.5	-.88	56.67	99.99	18.4	3	5.7	-1.3	-1.0	1000.	-5.	20.3	1.039	.963	0.	864	10.8
862.10	5.252	27.0	-.73	53.50	99.99	18.4	3	5.4	-1.0	-.7	1000.	-4.	20.3	1.020	.981	1.	865	0.0
863.10	5.259	25.8	-1.76	53.17	99.99	18.4	3	6.2	-1.2	-1.0	1000.	-5.	20.3	.974	.974	0.	866	101.8
864.11	5.266	25.0	-1.17	51.52	99.99	18.5	3	5.3	-1.2	-1.0	1000.	-5.	20.3	.944	.944	0.	867	43.5
865.11	5.273	24.5	-.73	50.44	99.99	18.5	3	4.7	-1.1	-1.0	1000.	-5.	20.3	.925	.925	0.	868	0.0
866.16	5.280	24.8	.44	24.13	.63	18.5	3	4.6	8.2	9.8	1068.	48.	15.8	.877	.903	29.	869	0.0
867.16	5.287	25.1	.44	24.28	.63	18.5	3	4.7	8.3	9.8	1077.	48.	15.8	.881	.903	29.	870	0.0
868.15	5.294	25.5	.59	21.58	.61	18.5	3	4.8	9.7	11.6	1121.	54.	14.5	.859	.904	33.	871	0.0
869.16	5.301	25.7	.29	26.74	.65	18.5	3	4.9	7.3	8.8	1072.	43.	16.6	.905	.905	27.	872	0.0
870.18	5.309	26.2	.73	19.46	.60	18.5	3	5.0	11.2	13.4	1168.	60.	13.1	.847	.904	37.	873	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HFE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
871.17	5.316	26.9	1.03	16.19	.58	18.5	3	5.3	14.3	17.0	1244.	72.	10.7	.817	.902	44.	874	0.0
872.17	5.324	27.5	.88	17.62	.59	18.5	3	5.5	13.3	15.8	1232.	67.	11.6	.843	.904	41.	875	0.0
873.17	5.331	27.8	.44	23.51	.62	18.5	3	5.6	9.5	11.4	1164.	51.	14.9	.902	.902	32.	876	0.0
874.18	5.339	28.4	.88	17.39	.59	18.5	3	5.8	13.9	16.6	1257.	69.	11.2	.853	.904	42.	877	0.0
875.18	5.347	29.0	.88	17.39	.59	18.5	3	6.0	14.2	16.9	1274.	70.	11.0	.860	.904	43.	878	0.0
876.19	5.355	29.2	.29	26.13	.64	18.5	3	6.0	8.8	10.4	1196.	46.	15.8	.922	.922	29.	879	0.0
877.17	5.363	29.1	-.15	36.72	.88	18.5	3	6.0	4.6	5.4	1147.	25.	18.8	.958	.958	18.	880	0.0
878.15	5.371	29.0	-.15	36.73	.88	18.5	3	6.0	4.5	5.3	1143.	24.	18.8	.958	.958	18.	881	0.0
879.12	5.379	28.9	-.15	36.74	.89	18.5	3	5.9	4.5	5.3	1139.	24.	18.8	.958	.958	18.	882	0.0
880.12	5.387	28.5	-.59	43.79	5.87	18.6	3	5.8	.3	.7	1109.	3.	20.4	.970	.970	6.	883	0.0
881.11	5.395	28.1	-.59	43.99	6.48	18.6	3	5.7	.3	.6	1094.	3.	20.4	.970	.970	6.	884	0.0
882.09	5.402	28.0	-.15	36.78	.91	18.6	3	5.6	4.3	5.0	1106.	24.	18.9	.956	.956	17.	885	0.0
883.09	5.410	28.0	0.00	33.16	.77	18.6	3	5.6	5.6	6.6	1122.	31.	18.1	.943	.943	21.	886	0.0
884.08	5.418	27.6	-.59	44.25	7.46	18.6	3	5.5	.2	.5	1074.	2.	20.4	.970	.970	5.	887	0.0
885.08	5.425	27.2	-.59	44.45	8.49	18.6	3	5.4	.1	.4	1059.	2.	20.4	.970	.970	5.	888	0.0
886.08	5.433	26.6	-.88	54.81	99.99	18.6	3	5.5	-1.2	-1.0	1000.	-5.	20.3	1.005	.995	0.	889	12.1
887.18	5.441	27.0	.59	21.25	.61	18.6	3	5.3	10.5	12.5	1162.	57.	13.9	.878	.903	35.	890	0.0
888.18	5.449	27.5	.73	19.20	.60	18.6	3	5.5	12.0	14.3	1204.	62.	12.6	.862	.904	38.	891	0.0
889.18	5.456	27.8	.44	23.51	.62	18.7	3	5.6	9.5	11.4	1164.	51.	14.9	.902	.902	32.	892	0.0
890.20	5.464	28.0	.29	26.42	.65	18.7	3	5.6	8.3	9.8	1153.	45.	16.1	.917	.917	29.	893	0.0
891.21	5.472	27.8	-.29	39.79	1.20	18.7	3	5.6	2.9	3.5	1085.	17.	19.4	.968	.968	13.	894	0.0
892.25	5.480	28.0	.29	26.42	.65	18.7	3	5.6	8.3	9.8	1153.	45.	16.1	.917	.917	29.	895	0.0
893.25	5.488	28.0	0.00	33.16	.77	18.7	3	5.6	5.6	6.6	1122.	31.	18.1	.943	.943	21.	896	0.0
894.25	5.496	28.0	0.00	33.16	.77	18.7	3	5.6	5.6	6.6	1122.	31.	18.1	.943	.943	21.	897	0.0
895.25	5.503	27.7	-.44	41.30	2.02	18.7	3	5.5	1.6	2.0	1078.	10.	20.0	.970	.970	9.	898	0.0
896.25	5.511	27.4	-.44	41.27	2.07	18.7	3	5.4	1.5	1.9	1067.	9.	20.0	.970	.970	9.	899	0.0
897.25	5.519	26.9	-.73	53.39	99.99	18.7	3	5.4	-1.0	-.7	1000.	-4.	20.3	1.016	.984	1.	900	0.0
898.25	5.526	26.6	-.44	41.20	2.22	18.8	3	5.2	1.4	1.7	1035.	9.	20.0	.970	.970	8.	901	0.0
899.23	5.533	26.5	-.15	36.79	.95	18.8	3	5.1	3.8	4.5	1050.	23.	18.9	.953	.953	16.	902	0.0
900.23	5.541	26.5	0.00	33.38	.79	18.8	3	5.1	5.1	6.0	1065.	30.	18.2	.940	.940	20.	903	0.0
901.23	5.548	26.5	0.00	33.38	.79	18.8	3	5.1	5.1	6.0	1065.	30.	18.2	.940	.940	20.	904	0.0
902.24	5.555	26.3	-.29	39.88	1.28	18.8	3	5.1	2.6	3.1	1028.	16.	19.4	.966	.966	12.	905	0.0
903.22	5.563	26.2	-.15	36.78	.96	18.8	3	5.0	3.8	4.4	1039.	22.	18.9	.952	.952	15.	906	0.0
904.22	5.570	26.2	0.00	33.39	.79	18.8	3	5.0	5.0	5.9	1054.	30.	18.2	.938	.938	19.	907	0.0
905.22	5.577	25.9	-.44	41.13	2.36	18.8	3	4.9	1.2	1.6	1008.	8.	20.0	.970	.970	7.	908	0.0
906.22	5.584	25.6	-.44	40.94	2.35	18.9	3	4.9	1.2	1.6	1000.	8.	20.0	.967	.967	7.	909	0.0
907.22	5.591	25.6	0.00	33.40	.80	18.9	3	4.9	4.9	5.7	1033.	29.	18.3	.936	.936	19.	910	0.0
908.23	5.599	25.9	.44	23.86	.62	18.9	3	4.9	8.6	10.4	1100.	50.	15.4	.890	.898	31.	911	0.0
909.21	5.606	25.8	-.15	36.77	.97	18.9	3	4.9	3.7	4.3	1024.	22.	18.9	.951	.951	15.	912	0.0
910.21	5.613	25.5	-.44	40.79	2.37	18.9	3	4.8	1.2	1.6	1000.	8.	20.0	.963	.963	7.	913	0.0
911.21	5.620	24.6	-1.32	50.69	99.99	18.9	3	5.3	-1.2	-1.0	1000.	-5.	20.3	.929	.929	0.	914	59.1
912.21	5.626	23.5	-1.61	48.43	99.99	18.9	3	5.3	-1.1	-1.0	1000.	-5.	20.3	.888	.888	0.	915	89.8
913.21	5.633	22.2	-1.91	45.75	99.99	18.9	3	5.1	-1.0	-1.0	1000.	-5.	20.3	.838	.838	0.	916	121.6
914.21	5.639	21.6	-.88	44.51	99.99	19.0	3	4.0	-1.0	-1.0	1000.	-5.	20.3	.816	.816	0.	917	18.7
915.21	5.645	21.6	0.00	29.89	.85	19.0	3	3.7	3.7	5.1	1000.	27.	18.5	.816	.816	17.	918	0.0
916.18	5.651	21.7	.15	27.68	.73	19.0	3	3.8	4.8	6.4	1000.	34.	17.8	.820	.820	21.	919	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
917.25	5.657	22.6	1.32	13.48	.60	19.0	2	4.0	13.7	16.7	1405.	62.	12.1	.923	.923	40.	920	0.0
918.25	5.664	23.4	1.17	14.47	.61	19.0	2	4.2	13.1	15.8	1440.	58.	12.8	.933	.933	38.	921	0.0
919.19	5.670	24.0	.88	17.99	.59	18.9	3	4.4	11.2	13.5	1137.	62.	12.9	.797	.900	38.	922	0.0
920.20	5.677	24.2	.29	26.89	.66	19.0	3	4.4	6.7	8.1	1019.	42.	16.9	.897	.897	26.	923	0.0
921.21	5.683	24.4	.29	26.87	.66	19.0	3	4.5	6.8	8.2	1027.	42.	16.8	.898	.898	26.	924	0.0
922.23	5.690	24.9	.73	19.69	.60	19.0	3	4.6	10.5	12.6	1133.	58.	13.6	.830	.903	36.	925	0.0
923.24	5.697	25.1	.29	26.81	.66	19.0	3	4.7	7.1	8.5	1051.	43.	16.7	.902	.902	26.	926	0.0
924.22	5.704	25.2	.15	30.05	.71	19.0	3	4.7	6.0	7.1	1036.	36.	17.5	.918	.918	23.	927	0.0
925.19	5.711	25.3	.15	30.04	.71	19.0	3	4.8	6.0	7.1	1040.	36.	17.5	.919	.919	23.	928	0.0
926.21	5.718	25.5	.29	26.77	.65	19.0	3	4.8	7.2	8.7	1065.	43.	16.6	.904	.904	27.	929	0.0
927.21	5.725	25.2	-.44	40.33	2.43	19.0	3	4.7	1.1	1.5	1000.	8.	20.0	.952	.952	7.	930	0.0
928.22	5.732	25.0	-.29	39.10	1.34	19.0	3	4.7	2.3	2.9	1000.	15.	19.4	.944	.944	11.	931	0.0
929.22	5.739	25.0	0.00	33.40	.81	19.0	3	4.7	4.7	5.5	1012.	29.	18.3	.933	.933	18.	932	0.0
930.22	5.746	25.0	0.00	33.40	.81	19.0	3	4.7	4.7	5.5	1012.	29.	18.3	.933	.933	18.	933	0.0
931.22	5.753	24.7	-.44	39.57	2.53	19.1	3	4.6	1.1	1.5	1000.	8.	20.0	.933	.933	7.	934	0.0
932.23	5.760	24.5	-.29	38.45	1.36	19.1	3	4.5	2.2	2.8	1000.	15.	19.4	.925	.925	11.	935	0.0
933.24	5.767	24.3	-.29	38.19	1.37	19.1	3	4.5	2.2	2.8	1000.	15.	19.4	.918	.918	11.	936	0.0
934.24	5.774	24.3	0.00	33.00	.82	19.1	3	4.5	4.5	5.4	1000.	28.	18.3	.918	.918	18.	937	0.0
935.25	5.780	24.5	.29	26.87	.66	19.1	3	4.5	6.8	8.3	1030.	42.	16.8	.898	.898	26.	938	0.0
936.27	5.787	25.0	.73	19.68	.60	19.1	3	4.7	10.6	12.7	1135.	59.	13.6	.832	.903	36.	939	0.0
937.27	5.794	25.0	0.00	33.40	.81	19.1	3	4.7	4.7	5.5	1012.	29.	18.3	.933	.933	18.	940	0.0
938.26	5.801	24.6	-.59	43.66	27.69	19.1	3	4.6	-.2	.1	1000.	1.	20.3	.929	.929	3.	941	0.0
939.26	5.808	24.6	0.00	33.33	.82	19.1	3	4.6	4.6	5.4	1000.	28.	18.3	.929	.929	18.	942	0.0
940.26	5.815	24.1	-.73	49.66	99.99	19.1	3	4.6	-1.1	-1.0	1000.	-5.	20.3	.910	.910	0.	943	.5
941.31	5.822	24.5	.59	21.77	.61	19.1	3	4.5	9.2	11.0	1093.	53.	14.8	.847	.904	32.	944	0.0
942.31	5.829	25.1	.88	17.95	.59	19.1	3	4.7	11.9	14.1	1168.	63.	12.6	.812	.902	39.	945	0.0
943.32	5.836	25.6	.73	19.57	.60	19.1	3	4.9	10.9	13.1	1151.	60.	13.4	.840	.903	36.	946	0.0
944.32	5.843	25.1	-.73	51.21	99.99	19.2	3	4.8	-1.1	-.9	1000.	-5.	20.3	.948	.948	0.	947	0.0
945.33	5.850	24.0	-1.61	49.46	99.99	19.2	3	5.4	-1.1	-1.0	1000.	-5.	20.3	.906	.906	0.	948	89.1
946.33	5.856	22.0	-2.93	45.33	99.99	19.2	3	6.0	-1.0	-1.0	1000.	-5.	20.3	.831	.831	0.	949	224.4
947.33	5.862	20.1	-2.79	41.42	99.99	19.2	3	5.3	-.9	-1.0	1000.	-5.	20.3	.759	.759	0.	950	212.6
948.34	5.867	16.9	-4.69	34.83	99.99	19.2	2	5.6	-1.2	-1.0	1000.	-5.	20.3	.970	.970	0.	951	400.7
949.34	5.871	13.6	-4.84	28.03	99.99	19.2	2	4.5	-.9	-1.0	1000.	-5.	20.3	.781	.781	0.	952	418.9
950.34	5.875	10.3	-4.84	21.22	99.99	19.2	2	3.3	-.7	-1.0	1000.	-5.	20.3	.591	.591	0.	953	401.5
951.35	5.877	7.0	-4.84	14.42	99.99	19.2	1	2.2	-.6	-1.0	1000.	-5.	20.3	.666	.666	0.	954	414.1
952.35	5.879	3.7	-4.84	7.62	99.99	19.2	1	1.2	-.4	-1.0	1000.	-5.	20.3	.352	.352	0.	955	415.8
953.35	5.879	.4	-4.84	.82	99.99	19.2	1	.1	-.0	-1.0	1000.	-5.	20.3	.038	.038	0.	956	417.0
954.34	5.879	0.0	-.59	0.00	11.44	19.2	1	0.0	.0	.3	1000.	2.	20.3	-.000	-.000	4.	957	0.0
955.34	5.879	0.0	0.00	0.00	11.44	19.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	958	0.0
956.34	5.879	0.0	0.00	0.00	11.44	19.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	959	0.0
957.34	5.880	2.0	2.93	2.35	.68	19.2	1	.2	2.2	7.5	1000.	39.	17.2	.190	.322	24.	960	0.0
958.34	5.881	5.3	4.84	4.06	.55	19.1	1	.7	9.1	14.1	1096.	74.	10.9	.502	.735	43.	961	0.0
959.34	5.883	8.6	4.84	4.72	.55	19.1	1	1.1	14.9	19.6	1203.	86.	8.1	.680	.864	51.	962	0.0
960.34	5.885	11.9	4.84	5.11	.53	19.1	1	1.7	20.7	26.1	1408.	97.	6.4	.804	.901	58.	963	0.0
961.34	5.889	15.2	4.84	5.39	.49	19.1	1	2.3	26.5	34.1	1616.	111.	5.1	.895	.895	64.	964	0.0
962.32	5.894	17.5	3.37	7.26	.52	19.0	2	2.8	22.0	27.6	1389.	104.	5.5	.723	.882	61.	965	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
963.33	5.899	18.6	1.61	11.96	.59	19.0	2	3.0	12.8	15.7	1238.	67.	11.7	.862	.904	41.	966	0.0
964.33	5.904	20.0	2.05	10.28	.57	19.0	2	3.3	16.7	20.5	1346.	80.	9.0	.853	.904	48.	967	0.0
965.33	5.910	21.1	1.61	11.83	.59	19.0	2	3.6	14.7	18.2	1345.	71.	10.6	.900	.900	44.	968	0.0
966.33	5.916	22.0	1.32	13.46	.60	19.0	2	3.8	13.3	16.2	1372.	62.	12.2	.921	.921	39.	969	0.0
967.33	5.922	23.0	1.47	12.70	.59	19.0	2	4.1	15.1	18.4	1434.	67.	11.1	.921	.921	42.	970	0.0
968.33	5.929	24.5	2.20	10.12	.53	19.0	2	4.5	22.1	27.2	1556.	92.	7.2	.904	.904	55.	971	0.0
969.33	5.936	26.3	2.64	9.28	.50	18.9	2	5.1	27.7	34.1	1673.	107.	5.6	.903	.903	62.	972	0.0
970.30	5.943	27.5	1.76	12.03	.54	18.9	3	5.5	21.2	25.5	1377.	97.	6.4	.754	.892	57.	973	0.0
971.30	5.951	28.1	.88	17.53	.59	18.9	3	5.7	13.7	16.2	1249.	68.	11.4	.850	.904	42.	974	0.0
972.30	5.958	28.4	.44	23.39	.62	18.9	3	5.8	9.8	11.7	1185.	52.	14.7	.905	.905	33.	975	0.0
973.28	5.966	28.5	.15	29.38	.68	18.9	3	5.8	7.2	8.5	1158.	38.	17.0	.930	.930	25.	976	0.0
974.28	5.974	28.5	0.00	33.07	.76	18.9	3	5.8	5.8	6.8	1140.	31.	18.0	.944	.944	21.	977	0.0
975.28	5.982	28.5	0.00	33.07	.76	19.0	3	5.8	5.8	6.8	1140.	31.	18.0	.944	.944	21.	978	0.0
976.28	5.990	27.7	-1.17	57.08	99.99	19.0	3	6.1	-1.3	-1.0	1000.	-5.	20.3	1.046	.956	0.	979	39.7
977.24	5.997	27.5	-.29	39.81	1.21	19.0	3	5.5	2.9	3.4	1073.	17.	19.4	.967	.967	13.	980	0.0
978.24	6.005	27.2	-.44	41.25	2.11	19.0	3	5.4	1.5	1.9	1059.	9.	20.0	.970	.970	9.	981	0.0
979.23	6.012	26.8	-.59	44.65	9.84	19.0	3	5.2	.1	.4	1043.	2.	20.4	.970	.970	4.	982	0.0
980.23	6.020	26.5	-.44	41.19	2.24	19.0	3	5.1	1.3	1.7	1032.	9.	20.0	.970	.970	8.	983	0.0
981.24	6.027	26.0	-.73	52.32	99.99	19.0	3	5.1	-1.1	-.8	1000.	-4.	20.3	.982	.982	0.	984	0.0
982.24	6.034	25.7	-.44	41.11	2.40	19.1	3	4.9	1.2	1.6	1000.	8.	20.0	.970	.970	7.	985	0.0
983.24	6.041	25.2	-.73	51.34	99.99	19.1	3	4.9	-1.1	-.9	1000.	-5.	20.3	.952	.952	0.	986	0.0
984.24	6.048	24.0	-1.76	49.46	99.99	19.1	3	5.6	-1.1	-1.0	1000.	-5.	20.3	.906	.906	0.	987	104.2
985.24	6.054	22.0	-2.93	45.33	99.99	19.1	3	6.0	-1.0	-1.0	1000.	-5.	20.3	.831	.831	0.	988	224.4
986.25	6.060	21.5	-.73	44.30	99.99	19.1	3	3.9	-1.0	-1.0	1000.	-5.	20.3	.812	.812	0.	989	3.7
987.25	6.066	21.5	0.00	29.78	.85	19.1	3	3.7	3.7	5.1	1000.	27.	18.5	.812	.812	17.	990	0.0
988.25	6.072	21.8	.44	24.04	.65	19.1	3	3.8	6.9	8.4	1000.	44.	16.7	.823	.890	27.	991	0.0
989.26	6.079	22.5	1.03	16.56	.58	19.1	3	4.0	11.5	13.9	1124.	65.	12.4	.756	.892	39.	992	0.0
990.26	6.085	23.0	.73	19.96	.60	19.1	3	4.1	9.6	11.5	1081.	56.	14.4	.803	.901	34.	993	0.0
991.27	6.091	22.8	-.29	35.94	1.46	19.1	3	4.0	1.9	2.6	1000.	14.	19.5	.861	.861	10.	994	0.0
992.27	6.098	22.8	0.00	31.29	.84	19.1	3	4.0	4.0	5.2	1000.	27.	18.4	.861	.861	18.	995	0.0
993.28	6.104	23.0	.29	26.68	.67	19.1	3	4.1	6.3	7.7	1000.	40.	17.1	.869	.887	25.	996	0.0
994.28	6.111	22.7	-.44	36.49	2.99	19.1	3	4.0	.8	1.2	1000.	7.	20.1	.857	.857	6.	997	0.0
995.28	6.117	22.7	0.00	31.18	.84	19.2	3	4.0	4.0	5.2	1000.	27.	18.4	.857	.857	17.	998	0.0
996.28	6.123	22.7	0.00	31.18	.84	19.2	3	4.0	4.0	5.2	1000.	27.	18.4	.857	.857	17.	999	0.0
997.42	6.130	23.5	1.17	14.48	.61	19.2	2	4.2	13.2	15.9	1445.	58.	12.8	.934	.934	38.	1000	0.0
998.35	6.137	24.0	.73	19.83	.60	19.2	3	4.4	10.1	12.1	1109.	57.	14.0	.818	.902	35.	1001	0.0
999.35	6.143	24.6	.88	18.02	.59	19.2	3	4.6	11.6	13.8	1154.	63.	12.8	.805	.901	38.	1002	0.0
1000.36	6.150	24.8	.29	26.84	.66	19.2	3	4.6	6.9	8.4	1041.	42.	16.8	.900	.900	26.	1003	0.0
1001.36	6.157	25.1	.44	24.28	.63	19.2	3	4.7	8.3	9.8	1077.	48.	15.8	.881	.903	29.	1004	0.0
1002.35	6.164	25.5	.59	21.58	.61	19.2	3	4.8	9.7	11.6	1121.	54.	14.5	.859	.904	33.	1005	0.0
1003.33	6.171	25.6	.15	30.00	.70	19.2	3	4.9	6.1	7.3	1050.	36.	17.5	.920	.920	23.	1006	0.0
1004.31	6.178	25.5	-.15	36.76	.98	19.2	3	4.8	3.6	4.2	1013.	22.	18.9	.951	.951	15.	1007	0.0
1005.31	6.185	25.0	-.73	51.08	99.99	19.2	3	4.8	-1.1	-.9	1000.	-5.	20.3	.944	.944	0.	1008	0.0
1006.31	6.192	24.1	-1.32	49.66	99.99	19.2	3	5.2	-1.1	-1.0	1000.	-5.	20.3	.910	.910	0.	1009	59.8
1007.31	6.199	23.7	-.59	42.57	131.00	19.2	3	4.3	-.2	.0	1000.	0.	20.3	.895	.895	3.	1010	0.0
1008.31	6.205	23.2	-.73	47.81	99.99	19.2	3	4.3	-1.1	-1.0	1000.	-5.	20.3	.876	.876	0.	1011	1.6

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.HOT SEG	BRAKES
1009.31	6.212	22.9	-.44	36.80	2.94	19.2	3	4.1	.8	1.3	1000.	7.	20.1	.865	.865	6.	1012	0.0
1010.31	6.218	22.5	-.59	41.03	99.99	19.3	3	4.0	-.3	-.1	1000.	-0.	20.3	.850	.850	3.	1013	0.0
1011.31	6.224	22.0	-.73	45.33	99.99	19.3	3	4.0	-1.0	-1.0	1000.	-5.	20.3	.831	.831	0.	1014	3.1
1012.31	6.230	21.6	-.59	39.83	99.99	19.3	3	3.8	-.4	-.2	1000.	-1.	20.3	.816	.816	2.	1015	0.0
1013.31	6.236	20.5	-1.61	42.24	99.99	19.3	3	4.4	-1.0	-1.0	1000.	-5.	20.3	.774	.774	0.	1016	93.4
1014.32	6.241	17.5	-4.40	36.06	99.99	19.3	2	5.6	-1.2	-1.0	1000.	-5.	20.3	1.005	.995	0.	1017	370.8
1015.32	6.246	14.2	-4.84	29.26	99.99	19.3	2	4.7	-1.0	-1.0	1000.	-5.	20.3	.815	.815	0.	1018	413.4
1016.32	6.249	10.9	-4.84	22.46	99.99	19.3	2	3.5	-.8	-1.0	1000.	-5.	20.3	.626	.626	0.	1019	421.1
1017.33	6.252	7.6	-4.84	15.66	99.99	19.3	1	2.4	-.9	-1.0	1000.	-5.	20.3	.723	.723	0.	1020	413.8
1018.33	6.253	4.3	-4.84	8.86	99.99	19.3	1	1.3	-.5	-1.0	1000.	-5.	20.3	.409	.409	0.	1021	415.5
1019.33	6.254	1.0	-4.84	2.06	99.99	19.3	1	.3	-.1	-1.0	1000.	-5.	20.3	.095	.095	0.	1022	416.8
1020.33	6.254	0.0	-1.47	0.00	11.44	19.3	1	0.0	.0	.3	1000.	2.	20.3	-.000	-.000	4.	1023	72.2
1021.33	6.254	0.0	0.00	0.00	11.44	19.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1024	0.0
1022.33	6.254	0.0	0.00	0.00	11.44	19.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1025	0.0
1023.33	6.254	0.0	0.00	0.00	11.44	19.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1026	0.0
1024.33	6.254	0.0	0.00	0.00	11.44	19.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1027	0.0
1025.33	6.254	0.0	0.00	0.00	11.44	19.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1028	0.0
1026.33	6.254	0.0	0.00	0.00	11.44	19.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1029	0.0
1027.33	6.254	0.0	0.00	0.00	11.44	19.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1030	0.0
1028.33	6.254	0.0	0.00	0.00	11.44	19.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1031	0.0
1029.33	6.254	0.0	0.00	0.00	11.44	19.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1032	0.0
1030.33	6.254	0.0	0.00	0.00	11.44	19.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1033	0.0
1031.33	6.254	0.0	0.00	0.00	11.44	19.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1034	0.0
1032.33	6.254	0.0	0.00	0.00	11.44	19.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1035	0.0
1033.33	6.254	0.0	0.00	0.00	11.44	19.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1036	0.0
1034.33	6.254	0.0	0.00	0.00	11.44	19.2	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1037	0.0
1035.33	6.254	0.0	0.00	0.00	11.44	19.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1038	0.0
1036.33	6.254	0.0	0.00	0.00	11.44	19.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1039	0.0
1037.33	6.254	0.0	0.00	0.00	11.44	19.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1040	0.0
1038.33	6.254	0.0	0.00	0.00	11.44	19.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1041	0.0
1039.33	6.254	0.0	0.00	0.00	11.44	19.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1042	0.0
1040.33	6.254	0.0	0.00	0.00	11.44	19.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1043	0.0
1041.33	6.254	0.0	0.00	0.00	11.44	19.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1044	0.0
1042.33	6.254	0.0	0.00	0.00	11.44	19.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1045	0.0
1043.33	6.254	0.0	0.00	0.00	11.44	19.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1046	0.0
1044.33	6.254	0.0	0.00	0.00	11.44	19.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1047	0.0
1045.33	6.254	0.0	0.00	0.00	11.44	19.1	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1048	0.0
1046.33	6.254	0.0	0.00	0.00	11.44	19.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1049	0.0
1047.33	6.254	0.0	0.00	0.00	11.44	19.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1050	0.0
1048.33	6.254	0.0	0.00	0.00	11.44	19.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1051	0.0
1049.33	6.254	0.0	0.00	0.00	11.44	19.0	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1052	0.0
1050.33	6.254	1.2	1.76	1.69	.89	19.0	1	.1	.8	4.8	1000.	25.	18.6	.114	.201	16.	1053	0.0
1051.33	6.255	4.0	4.11	3.69	.59	19.0	1	.5	5.9	11.0	1000.	58.	14.2	.381	.585	34.	1054	0.0
1052.33	6.257	7.3	4.84	4.50	.55	19.0	1	1.0	12.6	17.5	1119.	82.	8.8	.621	.830	48.	1055	0.0
1053.33	6.259	10.6	4.84	4.94	.55	18.9	1	1.5	18.4	23.4	1325.	93.	7.0	.761	.693	55.	1056	0.0
1054.33	6.263	13.9	4.84	5.34	.51	18.9	1	2.0	24.2	30.4	1533.	104.	5.7	.863	.904	61.	1057	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
1055.33	6.267	17.0	4.55	5.82	.50	18.9	1	2.7	28.1	35.2	1759.	105.	6.0	.920	920	62.	1058	0.0
1056.28	6.272	18.5	2.20	9.71	.57	18.9	2	3.0	16.2	20.0	1306.	80.	9.0	.813	.902	49.	1059	0.0
1057.28	6.277	20.0	2.20	9.85	.56	18.9	2	3.3	17.7	21.7	1363.	84.	8.4	.843	.904	50.	1060	0.0
1058.28	6.283	21.8	2.64	8.96	.53	18.8	2	3.8	22.5	27.6	1480.	98.	6.4	.845	.904	58.	1061	0.0
1059.27	6.289	23.0	1.76	11.65	.55	18.8	3	4.1	17.2	21.3	1258.	89.	7.5	.690	.869	53.	1062	0.0
1060.27	6.295	24.0	1.47	13.20	.56	18.8	3	4.4	15.8	19.3	1241.	82.	8.8	.731	.884	49.	1063	0.0
1061.27	6.302	24.8	1.17	15.22	.58	18.8	3	4.6	14.0	16.9	1209.	73.	10.5	.775	.897	44.	1064	0.0
1062.27	6.309	25.6	1.17	15.17	.58	18.8	3	4.9	14.6	17.5	1232.	75.	10.2	.785	.898	45.	1065	0.0
1063.27	6.316	26.5	1.32	14.13	.57	18.8	3	5.1	16.5	19.7	1281.	81.	8.9	.781	.898	49.	1066	0.0
1064.27	6.324	26.8	.44	23.71	.62	18.8	3	5.2	9.1	10.9	1128.	51.	15.1	.897	.897	31.	1067	0.0
1065.28	6.331	27.4	.88	17.54	.59	18.8	3	5.4	13.2	15.8	1229.	68.	11.5	.842	.903	41.	1068	0.0
1066.28	6.339	27.9	.73	19.12	.60	18.8	3	5.6	12.2	14.6	1215.	63.	12.5	.867	.904	39.	1069	0.0
1067.28	6.347	28.3	.59	20.83	.60	18.8	3	5.7	11.1	13.4	1199.	59.	13.3	.892	.897	36.	1070	0.0
1068.28	6.355	28.0	-.44	41.32	1.97	18.8	3	5.6	1.6	2.1	1090.	10.	20.0	.970	.970	9.	1071	0.0
1069.28	6.362	27.5	-.73	54.07	99.99	18.8	3	5.6	-1.0	-.7	1000.	-3.	20.3	1.039	.963	1.	1072	0.0
1070.29	6.370	27.0	-.73	53.50	99.99	18.9	3	5.4	-1.0	-.7	1000.	-4.	20.3	1.020	.981	1.	1073	0.0
1071.29	6.378	27.0	0.00	33.33	.78	18.9	3	5.3	5.3	6.2	1084.	30.	18.2	.941	.941	20.	1074	0.0
1072.28	6.385	26.3	-1.03	54.20	99.99	18.9	3	5.5	-1.2	-1.0	1000.	-5.	20.3	.993	.993	0.	1075	27.6
1073.28	6.392	24.5	-2.64	50.49	99.99	18.9	3	6.6	-1.1	-1.0	1000.	-5.	20.3	.925	.925	0.	1076	192.1
1074.29	6.399	22.5	-2.93	46.37	99.99	18.9	3	6.2	-1.1	-1.0	1000.	-5.	20.3	.850	.850	0.	1077	223.8
1075.28	6.405	21.5	-1.47	44.30	99.99	18.9	3	4.5	-1.0	-1.0	1000.	-5.	20.3	.812	.812	0.	1078	78.2
1076.28	6.410	20.6	-1.32	42.45	99.99	18.9	3	4.2	-1.0	-1.0	1000.	-5.	20.3	.778	.778	0.	1079	64.2
1077.28	6.416	18.0	-3.81	37.09	99.99	18.9	3	5.4	-.8	-1.0	1000.	-5.	20.3	.680	.680	0.	1080	317.5
1078.30	6.420	15.0	-4.40	30.91	99.99	18.9	2	4.7	-1.0	-1.0	1000.	-5.	20.3	.861	.861	0.	1081	373.2
1079.30	6.424	12.3	-3.96	25.35	99.99	18.9	2	3.6	-.9	-1.0	1000.	-5.	20.3	.706	.706	0.	1082	331.2
1080.30	6.428	11.1	-1.76	22.87	99.99	18.9	2	2.2	-.8	-1.0	1000.	-5.	20.3	.637	.637	0.	1083	110.0
1081.30	6.431	10.6	-.73	21.84	99.99	18.9	2	1.6	-.7	-1.0	1000.	-5.	20.3	.608	.608	0.	1084	6.4
1082.30	6.433	10.0	-.88	20.61	99.99	18.9	2	1.6	-.7	-1.0	1000.	-5.	20.3	.574	.574	0.	1085	22.0
1083.30	6.436	9.5	-.73	19.58	99.99	18.9	2	1.4	-.7	-1.0	1000.	-5.	20.3	.545	.545	0.	1086	7.2
1084.30	6.439	9.1	-.59	17.86	99.99	18.9	2	1.3	-.5	-.6	1000.	-3.	20.3	.522	.522	1.	1087	0.0
1085.29	6.441	8.7	-.59	17.10	99.99	18.9	2	1.2	-.5	-.7	1000.	-3.	20.3	.499	.499	1.	1088	0.0
1086.27	6.444	8.6	-.15	13.70	2.01	18.9	2	1.1	.7	1.9	1000.	10.	19.8	.494	.494	8.	1089	0.0
1087.28	6.446	8.8	.29	12.93	1.02	18.9	2	1.2	2.0	4.0	1000.	21.	18.9	.505	.577	14.	1090	0.0
1088.29	6.448	9.0	.29	13.20	1.01	18.9	2	1.2	2.1	4.0	1000.	21.	18.9	.517	.565	14.	1091	0.0
1089.29	6.451	8.7	-.44	15.43	26.01	18.9	2	1.2	-.1	.1	1000.	1.	20.3	.499	.499	3.	1092	0.0
1090.27	6.453	8.6	-.15	13.70	2.01	18.9	2	1.1	.7	1.9	1000.	10.	19.8	.494	.494	8.	1093	0.0
1091.27	6.456	8.0	-.88	16.49	99.99	18.9	2	1.2	-.6	-1.0	1000.	-5.	20.3	.459	.459	0.	1094	23.3
1092.29	6.458	7.0	-1.47	14.42	99.99	18.9	1	1.2	-.8	-1.0	1000.	-5.	20.3	.666	.666	0.	1095	69.2
1093.29	6.459	5.0	-2.93	10.30	99.99	18.9	1	1.2	-.6	-1.0	1000.	-5.	20.3	.476	.476	0.	1096	219.7
1094.29	6.461	4.2	-1.17	8.65	99.99	18.9	1	.7	-.5	-1.0	1000.	-5.	20.3	.400	.400	0.	1097	40.0
1095.29	6.462	2.6	-2.35	5.36	99.99	18.9	1	.5	-.3	-1.0	1000.	-5.	20.3	.247	.247	0.	1098	161.4
1096.29	6.462	1.0	-2.35	2.06	99.99	18.9	1	.2	-.1	-1.0	1000.	-5.	20.3	.095	.095	0.	1099	162.0
1097.29	6.462	0.0	-1.47	0.00	11.44	18.9	1	0.0	.0	.3	1000.	2.	20.3	-.000	-.000	4.	1100	72.2
1098.27	6.462	.1	.15	.16	2.68	18.9	1	.0	.0	1.3	1000.	7.	20.1	.010	.018	6.	1101	0.0
1099.27	6.462	.6	.73	.95	1.50	18.9	1	.1	.2	2.5	1000.	13.	19.5	.057	.104	10.	1102	0.0
1100.27	6.463	1.6	1.47	2.31	.95	18.9	1	.2	1.0	4.3	1000.	23.	18.8	.152	.255	15.	1103	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.NOT	SEG	BRAKES
1101.27	6.463	3.6	2.93	3.99	.65	18.9	1	.4	3.9	8.3	1000.	44.	16.7	.343	.522	26.	1104	0.0
1102.27	6.465	6.9	4.84	4.47	.55	18.9	1	.9	11.9	16.6	1097.	80.	9.4	.599	.814	47.	1105	0.0
1103.27	6.467	10.0	4.55	5.11	.56	18.8	1	1.4	16.4	21.0	1270.	87.	7.9	.749	.890	52.	1106	0.0
1104.27	6.470	12.8	4.11	5.80	.55	18.8	1	1.8	19.2	24.2	1416.	90.	7.5	.860	.904	54.	1107	0.0
1105.25	6.474	14.0	1.76	11.31	.59	18.8	2	2.1	10.1	12.6	1079.	61.	13.3	.745	.889	37.	1108	0.0
1106.25	6.478	14.5	.73	17.36	.69	18.8	2	2.2	5.6	7.2	1000.	38.	17.3	.832	.857	23.	1109	0.0
1107.27	6.482	16.0	2.20	9.66	.57	18.8	2	2.4	13.9	17.3	1208.	75.	10.2	.761	.893	45.	1110	0.0
1108.28	6.487	18.1	3.08	7.79	.53	18.8	2	2.9	21.0	26.1	1383.	99.	6.1	.751	.891	58.	1111	0.0
1109.28	6.492	20.0	2.79	8.50	.53	18.8	2	3.3	21.5	26.4	1427.	97.	6.4	.804	.901	57.	1112	0.0
1110.27	6.498	21.0	1.47	12.51	.60	18.7	2	3.6	13.6	16.8	1331.	66.	11.5	.906	.906	41.	1113	0.0
1111.14	6.503	21.2	.29	25.38	.69	18.8	3	3.6	5.6	7.2	1000.	38.	17.3	.801	.844	23.	1114	0.0
1112.12	6.509	21.3	.15	27.26	.73	18.8	3	3.7	4.7	6.4	1000.	33.	17.9	.804	.806	21.	1115	0.0
1113.10	6.515	21.4	.15	27.35	.73	18.8	3	3.7	4.7	6.4	1000.	34.	17.8	.808	.808	21.	1116	0.0
1114.10	6.521	21.7	.44	23.97	.65	18.8	3	3.8	6.9	8.3	1000.	44.	16.7	.820	.885	26.	1117	0.0
1115.12	6.527	22.5	1.17	15.29	.58	18.8	3	4.0	12.5	15.2	1150.	69.	11.4	.739	.837	42.	1118	0.0
1116.12	6.533	23.0	.73	19.96	.60	18.8	3	4.1	9.6	11.5	1081.	56.	14.4	.803	.901	34.	1119	0.0
1117.13	6.540	23.8	1.17	15.27	.58	18.8	3	4.3	13.4	16.1	1183.	72.	10.9	.760	.893	43.	1120	0.0
1118.13	6.546	24.5	1.03	16.43	.58	18.8	3	4.5	12.7	15.3	1178.	68.	11.6	.786	.899	41.	1121	0.0
1119.13	6.553	25.0	.73	19.68	.60	18.8	3	4.7	10.6	12.7	1135.	59.	13.6	.832	.903	36.	1122	0.0
1120.11	6.560	24.9	-.15	36.41	1.00	18.8	3	4.6	3.4	4.1	1000.	22.	18.9	.940	.940	14.	1123	0.0
1121.09	6.567	24.8	-.15	36.29	1.00	18.8	3	4.6	3.4	4.1	1000.	21.	18.9	.937	.937	14.	1124	0.0
1122.10	6.574	25.0	.29	26.82	.66	18.8	3	4.7	7.0	8.5	1048.	43.	16.7	.901	.901	26.	1125	0.0
1123.09	6.581	25.4	.59	21.60	.61	18.8	3	4.8	9.7	11.6	1118.	54.	14.5	.858	.904	33.	1126	0.0
1124.09	6.588	25.8	.59	21.52	.61	18.8	3	4.9	9.9	11.8	1129.	55.	14.3	.863	.904	34.	1127	0.0
1125.10	6.595	26.0	.29	26.71	.65	18.8	3	5.0	7.4	8.9	1083.	43.	16.5	.907	.907	27.	1128	0.0
1126.10	6.602	26.4	.59	21.39	.61	18.8	3	5.1	10.2	12.2	1145.	56.	14.1	.870	.903	34.	1129	0.0
1127.11	6.610	26.6	.29	26.63	.65	18.8	3	5.2	7.7	9.2	1104.	44.	16.4	.910	.910	27.	1130	0.0
1128.11	6.617	26.9	.44	23.69	.62	18.8	3	5.3	9.1	10.9	1132.	51.	15.1	.898	.898	32.	1131	0.0
1129.08	6.625	27.0	.15	29.71	.69	18.8	3	5.3	6.6	7.8	1103.	37.	17.3	.925	.925	24.	1132	0.0
1130.08	6.632	27.0	0.00	33.33	.78	18.8	3	5.3	5.3	6.2	1084.	30.	18.2	.941	.941	20.	1133	0.0
1131.08	6.640	27.0	0.00	33.33	.78	18.8	3	5.3	5.3	6.2	1084.	30.	18.2	.941	.941	20.	1134	0.0
1132.06	6.647	26.9	-.15	36.79	.94	18.8	3	5.3	3.9	4.6	1065.	23.	18.9	.954	.954	16.	1135	0.0
1133.04	6.654	26.8	-.15	36.79	.94	18.9	3	5.2	3.9	4.6	1061.	23.	18.9	.954	.954	16.	1136	0.0
1134.04	6.662	26.8	0.00	33.36	.78	18.9	3	5.2	5.2	6.1	1076.	30.	18.2	.941	.941	20.	1137	0.0
1135.04	6.669	26.5	-.44	41.19	2.24	18.9	3	5.1	1.3	1.7	1032.	9.	20.0	.970	.970	8.	1138	0.0
1136.02	6.676	26.4	-.15	36.78	.96	18.9	3	5.1	3.8	4.5	1046.	23.	18.9	.953	.953	16.	1139	0.0
1137.01	6.684	26.0	-.59	45.18	11.71	18.9	3	5.0	-.0	.3	1000.	2.	20.3	.982	.982	4.	1140	0.0
1138.02	6.691	25.5	-.73	51.71	99.99	18.9	3	5.0	-1.1	-.9	1000.	-5.	20.3	.963	.963	0.	1141	0.0
1139.02	6.698	24.6	-1.32	50.69	99.99	18.9	3	5.3	-1.2	-1.0	1000.	-5.	20.3	.929	.929	0.	1142	59.1
1140.02	6.704	23.5	-1.61	48.43	99.99	18.9	3	5.3	-1.1	-1.0	1000.	-5.	20.3	.888	.888	0.	1143	89.8
1141.02	6.711	21.5	-2.93	44.30	99.99	18.9	3	5.9	-1.0	-1.0	1000.	-5.	20.3	.812	.812	0.	1144	225.0
1142.02	6.716	20.0	-2.20	41.21	99.99	18.9	3	4.7	-.9	-1.0	1000.	-5.	20.3	.755	.755	0.	1145	153.4
1143.03	6.722	17.5	-3.67	36.06	99.99	19.0	2	5.1	-1.2	-1.0	1000.	-5.	20.3	1.005	.995	0.	1146	297.1
1144.03	6.726	16.0	-2.20	32.97	99.99	19.0	2	3.6	-1.1	-1.0	1000.	-5.	20.3	.918	.918	0.	1147	150.2
1145.03	6.731	14.0	-2.93	28.85	99.99	19.0	2	3.5	-1.0	-1.0	1000.	-5.	20.3	.804	.804	0.	1148	225.7
1146.03	6.734	10.7	-4.84	22.05	99.99	19.0	2	3.5	-.7	-1.0	1000.	-5.	20.3	.614	.614	0.	1149	421.2

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
1147.04	6.736	7.4	-4.84	15.25	99.99	19.0	1	2.3	-.9	-1.0	1000.	-5.	20.3	.704	.704	0.	1150	413.9
1148.04	6.738	4.1	-4.84	8.45	99.99	19.0	1	1.3	-.5	-1.0	1000.	-5.	20.3	.390	.390	0.	1151	415.6
1149.04	6.739	.8	-4.84	1.65	99.99	19.0	1	.2	-.1	-1.0	1000.	-5.	20.3	.076	.076	0.	1152	416.9
1150.05	6.739	0.0	-1.17	0.00	11.44	19.0	1	0.0	.0	.3	1000.	2.	20.3	-.000	-.000	4.	1153	41.5
1151.05	6.739	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1154	0.0
1152.05	6.739	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1155	0.0
1153.05	6.739	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1156	0.0
1154.05	6.739	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1157	0.0
1155.05	6.739	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1158	0.0
1156.05	6.739	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1159	0.0
1157.05	6.739	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1160	0.0
1158.05	6.739	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1161	0.0
1159.05	6.739	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1162	0.0
1160.05	6.739	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1163	0.0
1161.05	6.739	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1164	0.0
1162.05	6.739	0.0	0.00	0.00	11.44	18.9	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1165	0.0
1163.05	6.739	0.0	0.00	0.00	11.44	18.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1166	0.0
1164.05	6.739	0.0	0.00	0.00	11.44	18.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1167	0.0
1165.05	6.739	0.0	0.00	0.00	11.44	18.8	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1168	0.0
1166.05	6.739	2.1	3.08	2.40	.67	18.8	1	.3	2.4	7.8	1000.	41.	17.0	.200	.337	25.	1169	0.0
1167.05	6.740	5.4	4.84	4.10	.55	18.8	1	.7	9.3	14.2	1010.	74.	10.9	.509	.742	43.	1170	0.0
1168.05	6.742	8.7	4.84	4.74	.55	18.8	1	1.2	15.0	19.8	1209.	86.	8.0	.685	.866	51.	1171	0.0
1169.05	6.745	12.0	4.84	5.12	.53	18.8	1	1.7	20.8	26.3	1415.	98.	6.3	.807	.901	58.	1172	0.0
1170.05	6.749	15.3	4.84	5.40	.49	18.7	1	2.3	26.7	34.3	1625.	111.	5.1	.896	.896	64.	1173	0.0
1171.05	6.754	18.6	4.84	5.70	.48	18.7	1	3.0	32.7	40.8	1910.	112.	5.6	.927	.927	65.	1174	0.0
1172.01	6.759	21.1	3.67	7.33	.48	18.7	2	3.6	28.8	35.5	1552.	120.	4.1	.780	.898	69.	1175	0.0
1173.01	6.765	23.0	2.79	8.79	.51	18.7	2	4.1	25.0	30.6	1543.	104.	5.7	.856	.904	61.	1176	0.0
1173.98	6.771	23.5	.73	19.90	.60	18.7	3	4.2	9.8	11.8	1095.	56.	14.2	.611	.902	34.	1177	0.0
1174.98	6.778	23.0	-.73	47.40	99.99	18.7	3	4.3	-1.1	-1.0	1000.	-5.	20.3	.869	.869	0.	1178	1.9
1175.98	6.784	22.5	-.73	46.37	99.99	18.7	3	4.1	-1.1	-1.0	1000.	-5.	20.3	.850	.850	0.	1179	2.5
1176.98	6.790	20.0	-3.67	41.21	99.99	18.7	3	6.0	-.9	-1.0	1000.	-5.	20.3	.755	.755	0.	1180	301.2
1177.99	6.795	16.7	-4.84	34.41	99.99	18.7	2	5.6	-1.2	-1.0	1000.	-5.	20.3	.959	.959	0.	1181	416.0
1178.99	6.799	13.4	-4.84	27.61	99.99	18.7	2	4.4	-.9	-1.0	1000.	-5.	20.3	.769	.769	0.	1182	419.1
1179.99	6.803	10.1	-4.84	20.81	99.99	18.7	2	3.3	-.7	-1.0	1000.	-5.	20.3	.580	.580	0.	1183	421.7
1181.00	6.805	6.8	-4.84	14.01	99.99	18.7	1	2.2	-.8	-1.0	1000.	-5.	20.3	.647	.647	0.	1184	414.2
1182.00	6.806	3.5	-4.84	7.21	99.99	18.7	1	1.1	-.4	-1.0	1000.	-5.	20.3	.333	.333	0.	1185	415.9
1183.00	6.807	.2	-4.84	.41	99.99	18.7	1	.1	-.0	-1.0	1000.	-5.	20.3	.019	.019	0.	1186	417.1
1184.02	6.807	0.0	-.29	0.00	11.44	18.7	1	0.0	-.0	.3	1000.	2.	20.3	-.000	-.000	4.	1187	0.0
1185.02	6.807	0.0	0.00	0.00	11.44	18.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1188	0.0
1186.02	6.807	0.0	0.00	0.00	11.44	18.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1189	0.0
1187.02	6.807	0.0	0.00	0.00	11.44	18.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1190	0.0
1188.02	6.807	0.0	0.00	0.00	11.44	18.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1191	0.0
1189.02	6.807	0.0	0.00	0.00	11.44	18.7	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1192	0.0
1190.02	6.807	0.0	0.00	0.00	11.44	18.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1193	0.0
1191.02	6.807	0.0	0.00	0.00	11.44	18.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1194	0.0
1192.02	6.807	0.0	0.00	0.00	11.44	18.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1195	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.HOT SEG	BRAKES
1193.02	6.807	0.0	0.00	0.00	11.44	18.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4. 1196	0.0
1194.03	6.807	.2	.29	.32	2.37	18.6	1	.0	.0	1.6	1000.	8.	20.0	.019	.036	7. 1197	0.0
1195.03	6.807	1.5	1.91	2.06	.84	18.6	1	.2	1.1	5.2	1000.	27.	18.4	.143	.245	18. 1198	0.0
1196.03	6.808	3.5	2.93	3.89	.65	18.6	1	.4	3.8	8.2	1000.	43.	16.7	.333	.510	26. 1199	0.0
1197.03	6.809	6.5	4.40	4.80	.56	18.6	1	.8	10.3	14.4	1044.	73.	11.1	.592	.810	42. 1200	0.0
1198.03	6.811	9.8	4.84	4.83	.55	18.6	1	1.3	17.0	21.9	1278.	90.	7.4	.730	.884	53. 1201	0.0
1199.03	6.815	12.0	3.23	6.72	.58	18.5	1	1.7	14.5	18.2	1302.	74.	10.2	.677	.903	45. 1202	0.0
1199.99	6.818	12.9	1.32	13.35	.62	18.5	2	1.9	7.4	9.3	1000.	49.	15.8	.741	.872	29. 1203	0.0
1200.97	6.821	13.0	.15	19.24	1.04	18.5	2	1.9	2.5	3.9	1000.	20.	19.0	.746	.746	14. 1204	0.0
1201.96	6.825	12.6	-.59	24.27	99.99	18.5	2	1.9	-.6	-.5	1000.	-3.	20.3	.723	.723	1. 1205	0.0
1202.98	6.828	12.8	.29	18.12	.90	18.5	2	1.8	3.0	4.7	1000.	25.	18.7	.735	.735	16. 1206	0.0
1203.98	6.832	13.1	.44	17.53	.80	18.5	2	1.9	3.8	5.6	1000.	29.	18.2	.752	.754	19. 1207	0.0
1204.98	6.836	13.1	0.00	20.36	1.29	18.5	2	1.9	1.9	3.0	1000.	16.	19.3	.752	.752	11. 1208	0.0
1205.98	6.839	14.0	1.32	13.73	.61	18.5	2	2.1	8.1	10.0	1020.	51.	15.4	.788	.849	31. 1209	0.0
1206.98	6.844	15.5	2.20	9.63	.57	18.5	2	2.3	13.4	16.8	1190.	74.	10.4	.748	.890	44. 1210	0.0
1207.98	6.848	17.0	2.20	9.69	.57	18.5	2	2.7	14.8	18.3	1246.	77.	9.7	.783	.898	46. 1211	0.0
1208.98	6.853	18.6	2.35	9.33	.56	18.5	2	3.0	17.2	21.2	1326.	84.	8.3	.805	.901	51. 1212	0.0
1209.99	6.858	19.7	1.61	11.87	.59	18.5	2	3.3	13.6	16.8	1280.	69.	11.2	.883	.902	42. 1213	0.0
1210.98	6.864	21.0	1.91	10.79	.57	18.5	2	3.6	16.6	20.4	1368.	78.	9.3	.881	.903	48. 1214	0.0
1211.95	6.870	21.5	.73	20.13	.60	18.5	3	3.7	8.8	10.6	1039.	54.	14.9	.782	.898	32. 1215	0.0
1212.95	6.876	21.8	.44	24.04	.65	18.5	3	3.8	6.9	8.4	1000.	44.	16.7	.823	.890	27. 1216	0.0
1213.95	6.882	21.8	0.00	30.13	.85	18.5	3	3.8	3.8	5.1	1000.	27.	18.5	.823	.823	17. 1217	0.0
1214.95	6.888	21.5	-.44	34.63	3.34	18.5	3	3.7	.6	1.1	1000.	6.	20.2	.812	.812	6. 1218	0.0
1215.95	6.894	21.2	-.44	34.16	3.44	18.5	3	3.6	.6	1.1	1000.	6.	20.2	.801	.801	6. 1219	0.0
1216.95	6.900	21.5	.44	23.84	.65	18.5	3	3.7	6.8	8.3	1000.	44.	16.7	.812	.883	26. 1220	0.0
1217.95	6.906	21.8	.44	24.04	.65	18.5	3	3.8	6.9	8.4	1000.	44.	16.7	.823	.890	27. 1221	0.0
1218.96	6.912	22.0	.29	25.98	.68	18.5	3	3.8	5.9	7.4	1000.	39.	17.2	.831	.863	24. 1222	0.0
1219.94	6.918	21.9	-.15	32.62	1.07	18.5	3	3.8	2.7	3.8	1000.	20.	19.0	.827	.827	13. 1223	0.0
1220.95	6.924	21.7	-.29	34.26	1.53	18.5	3	3.8	1.7	2.5	1000.	13.	19.5	.820	.820	10. 1224	0.0
1221.96	6.930	21.5	-.29	33.96	1.54	18.5	3	3.7	1.7	2.5	1000.	13.	19.5	.812	.812	10. 1225	0.0
1222.96	6.936	21.5	0.00	29.78	.85	18.6	3	3.7	3.7	5.1	1000.	27.	18.5	.812	.812	17. 1226	0.0
1223.94	6.942	21.4	-.15	31.97	1.08	18.6	3	3.7	2.6	3.7	1000.	19.	19.0	.808	.808	13. 1227	0.0
1224.94	6.948	20.1	-1.91	41.42	99.99	18.6	3	4.5	-.9	-1.0	1000.	-5.	20.3	.759	.759	0. 1228	124.1
1225.94	6.953	19.5	-.88	40.18	99.99	18.6	3	3.5	-.9	-1.0	1000.	-5.	20.3	.736	.736	0. 1229	21.2
1226.94	6.958	19.2	-.44	31.16	4.22	18.6	3	3.1	.4	.9	1000.	5.	20.3	.725	.725	5. 1230	0.0
1227.94	6.964	19.6	.59	21.01	.63	18.6	3	3.2	7.0	8.8	1000.	46.	16.3	.740	.858	28. 1231	0.0
1228.95	6.969	19.8	.29	24.27	.70	18.6	3	3.3	5.1	6.9	1000.	36.	17.5	.748	.808	22. 1232	0.0
1229.97	6.975	20.0	.29	24.42	.70	18.6	3	3.3	5.2	7.0	1000.	37.	17.5	.755	.813	23. 1233	0.0
1230.97	6.980	19.5	-.73	40.18	99.99	18.6	3	3.4	-.9	-1.0	1000.	-5.	20.3	.736	.736	0. 1234	6.1
1231.99	6.986	17.5	-2.93	36.06	99.99	18.6	2	4.5	-1.2	-1.0	1000.	-5.	20.3	1.005	.995	0. 1235	222.4
1232.99	6.990	15.5	-2.93	31.94	99.99	18.6	2	3.9	-1.1	-1.0	1000.	-5.	20.3	.890	.890	0. 1236	224.4
1233.99	6.994	13.0	-3.67	26.79	99.99	18.6	2	3.6	-.9	-1.0	1000.	-5.	20.3	.746	.746	0. 1237	301.3
1234.99	6.997	10.0	-4.40	20.61	99.99	18.6	2	3.0	-.7	-1.0	1000.	-5.	20.3	.574	.574	0. 1238	377.3
1235.99	7.000	8.0	-2.93	16.49	99.99	18.6	2	1.9	-.6	-1.0	1000.	-5.	20.3	.459	.459	0. 1239	230.3
1237.01	7.002	6.0	-2.93	12.36	99.99	18.6	1	1.4	-.7	-1.0	1000.	-5.	20.3	.571	.571	0. 1240	219.2
1238.01	7.003	4.0	-2.93	8.24	99.99	18.6	1	.9	-.5	-1.0	1000.	-5.	20.3	.381	.381	0. 1241	220.2

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	MPW	MPE	RPM	TORQ	VAC	SR	ETA	PCT.HOT	SEG	BRAKES
1239.01	7.004	2.5	-2.20	5.15	99.99	18.6	1	.5	-.3	-1.0	1000.	-5.	20.3	.238	.238	0.	1242	146.1
1240.01	7.005	.7	-2.64	1.44	99.99	18.6	1	.2	-.1	-1.0	1000.	-5.	20.3	.067	.067	0.	1243	191.8
1241.01	7.005	0.0	-1.03	0.00	11.44	18.6	1	0.0	.0	.3	1000.	2.	20.3	-.000	-.000	4.	1244	27.2
1242.01	7.005	0.0	0.00	0.00	11.44	18.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1245	0.0
1243.01	7.005	0.0	0.00	0.00	11.44	18.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1246	0.0
1244.01	7.005	0.0	0.00	0.00	11.44	18.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1247	0.0
1245.01	7.005	0.0	0.00	0.00	11.44	18.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1248	0.0
1246.01	7.005	0.0	0.00	0.00	11.44	18.6	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1249	0.0
1247.01	7.005	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1250	0.0
1248.01	7.005	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1251	0.0
1249.00	7.005	1.0	1.47	1.46	1.00	18.5	1	.1	.6	4.1	1000.	22.	18.9	.095	.169	14.	1252	0.0
1250.00	7.005	1.0	0.00	1.61	3.21	18.5	1	.1	.1	1.2	1000.	6.	20.2	.095	.150	6.	1253	0.0
1251.00	7.005	1.0	0.00	1.61	3.21	18.5	1	.1	.1	1.2	1000.	6.	20.2	.095	.150	6.	1254	0.0
1252.00	7.006	1.0	0.00	1.61	3.21	18.5	1	.1	.1	1.2	1000.	6.	20.2	.095	.150	6.	1255	0.0
1253.00	7.006	1.0	0.00	1.61	3.21	18.5	1	.1	.1	1.2	1000.	6.	20.2	.095	.150	6.	1256	0.0
1254.00	7.006	1.6	.88	2.46	1.24	18.5	1	.2	.7	3.1	1000.	16.	19.3	.152	.247	12.	1257	0.0
1255.01	7.007	3.0	2.05	3.89	.75	18.5	1	.4	2.4	6.1	1000.	32.	18.0	.286	.437	20.	1258	0.0
1256.00	7.008	4.0	1.47	5.47	.83	18.5	1	.5	2.4	5.3	1000.	28.	18.4	.381	.522	18.	1259	0.0
1257.00	7.009	5.0	1.47	6.68	.79	18.5	1	.6	3.1	5.6	1000.	30.	18.2	.476	.609	19.	1260	0.0
1258.00	7.011	6.3	1.91	7.56	.69	18.5	1	.8	4.8	7.2	1000.	38.	17.4	.600	.734	23.	1261	0.0
1259.00	7.013	8.0	2.49	8.22	.62	18.5	1	1.1	7.6	9.4	1000.	50.	15.7	.761	.887	30.	1262	0.0
1260.00	7.015	10.0	2.93	7.25	.59	18.4	1	1.4	11.0	13.9	1154.	63.	12.6	.825	.903	38.	1263	0.0
1261.01	7.018	10.5	.73	14.23	.89	18.4	1	1.4	4.0	5.0	1052.	25.	18.7	.950	.950	17.	1264	0.0
1262.00	7.021	9.5	-1.47	19.58	99.99	18.4	1	1.7	-1.1	-1.0	1000.	-5.	20.3	.904	.904	0.	1265	67.6
1263.00	7.023	8.5	-1.47	17.52	99.99	18.4	1	1.5	-1.0	-1.0	1000.	-5.	20.3	.809	.809	0.	1266	68.3
1264.00	7.026	7.6	-1.32	15.66	99.99	18.4	1	1.3	-.9	-1.0	1000.	-5.	20.3	.723	.723	0.	1267	53.5
1265.02	7.028	8.8	1.76	10.05	.66	18.4	1	1.2	6.3	7.9	1000.	41.	17.0	.838	.882	25.	1268	0.0
1266.02	7.031	11.0	3.23	6.72	.58	18.4	1	1.5	13.2	16.7	1239.	71.	10.9	.845	.904	43.	1269	0.0
1267.03	7.034	14.0	4.40	5.65	.52	18.4	1	2.1	22.4	28.2	1510.	98.	6.4	.882	.903	58.	1270	0.0
1268.03	7.039	17.0	4.40	5.92	.50	18.4	1	2.7	27.3	34.3	1755.	103.	6.3	.922	.922	60.	1271	0.0
1269.00	7.043	19.5	3.67	7.17	.49	18.4	2	3.2	26.5	32.9	1493.	116.	4.4	.750	.890	67.	1272	0.0
1270.00	7.049	21.0	2.20	9.93	.55	18.3	2	3.6	18.6	22.8	1402.	86.	8.1	.860	.904	51.	1273	0.0
1270.99	7.055	21.8	1.17	15.30	.58	18.3	3	3.8	12.1	14.7	1132.	68.	11.7	.727	.883	41.	1274	0.0
1271.98	7.061	22.2	.59	21.99	.62	18.3	3	3.9	8.1	9.8	1031.	50.	15.6	.614	.902	30.	1275	0.0
1272.99	7.067	23.0	1.17	15.29	.58	18.3	3	4.1	12.8	15.5	1163.	70.	11.2	.747	.889	42.	1276	0.0
1273.99	7.074	23.6	.88	15.14	.59	18.3	3	4.3	11.0	13.1	1126.	61.	13.2	.791	.899	37.	1277	0.0
1275.00	7.081	24.1	.73	19.81	.60	18.3	3	4.4	10.1	12.1	1111.	57.	14.0	.819	.902	35.	1278	0.0
1275.99	7.087	24.5	.59	21.77	.61	18.3	3	4.5	9.2	11.0	1093.	53.	14.8	.847	.904	32.	1279	0.0
1276.99	7.094	24.5	0.00	33.22	.82	18.4	3	4.5	4.5	5.4	1000.	28.	18.3	.925	.925	18.	1280	0.0
1278.00	7.101	24.0	-.73	49.46	99.99	18.4	3	4.5	-1.1	-1.0	1000.	-5.	20.3	.906	.906	0.	1281	.6
1279.00	7.107	23.5	-.73	48.43	99.99	18.4	3	4.4	-1.1	-1.0	1000.	-5.	20.3	.888	.888	0.	1282	1.2
1280.00	7.114	23.5	0.00	32.09	.83	18.4	3	4.2	4.2	5.3	1000.	28.	18.4	.888	.888	18.	1283	0.0
1281.00	7.120	23.5	0.00	32.09	.83	18.4	3	4.2	4.2	5.3	1000.	28.	18.4	.888	.888	18.	1284	0.0
1282.00	7.127	23.5	0.00	32.09	.83	18.4	3	4.2	4.2	5.3	1000.	28.	18.4	.888	.888	18.	1285	0.0
1283.00	7.134	23.5	0.00	32.09	.83	18.4	3	4.2	4.2	5.3	1000.	28.	18.4	.888	.888	18.	1286	0.0
1284.00	7.140	23.5	0.00	32.09	.83	18.4	3	4.2	4.2	5.3	1000.	28.	18.4	.888	.888	18.	1287	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
1285.03	7.147	24.0	.73	19.83	.60	18.4	3	4.4	10.1	12.1	1109.	57.	14.0	.818	.902	35.	1288	0.0
1286.00	7.153	24.1	.15	30.12	.71	18.4	3	4.4	5.6	6.7	1000.	35.	17.7	.910	.910	22.	1289	0.0
1287.01	7.160	24.5	.59	21.77	.61	18.4	3	4.5	9.2	11.0	1093.	53.	14.8	.847	.904	32.	1290	0.0
1288.02	7.167	24.7	.29	26.85	.66	18.4	3	4.6	6.9	8.4	1037.	42.	16.8	.899	.899	26.	1291	0.0
1289.02	7.174	25.0	.44	24.32	.63	18.4	3	4.7	8.2	9.8	1074.	48.	15.8	.879	.903	29.	1292	0.0
1290.01	7.181	25.4	.59	21.60	.61	18.4	3	4.8	9.7	11.6	1118.	54.	14.5	.858	.904	33.	1293	0.0
1291.02	7.189	25.6	.29	26.75	.65	18.4	3	4.9	7.3	8.7	1069.	43.	16.6	.905	.905	27.	1294	0.0
1292.00	7.195	25.7	.15	29.98	.70	18.4	3	4.9	6.1	7.3	1054.	36.	17.5	.921	.921	23.	1295	0.0
1293.00	7.202	26.0	.44	24.01	.62	18.5	3	5.0	8.7	10.4	1102.	49.	15.4	.891	.898	31.	1296	0.0
1294.01	7.210	26.2	.29	26.68	.65	18.5	3	5.0	7.5	9.0	1090.	43.	16.5	.908	.908	27.	1297	0.0
1295.08	7.217	27.0	1.17	15.08	.58	18.5	3	5.3	15.5	18.6	1271.	77.	9.7	.802	.901	47.	1298	0.0
1296.09	7.225	27.8	1.17	15.03	.57	18.4	3	5.6	16.1	19.2	1293.	78.	9.4	.812	.902	47.	1299	0.0
1297.09	7.233	28.3	.73	19.04	.60	18.5	3	5.7	12.4	14.9	1226.	64.	12.3	.872	.903	39.	1300	0.0
1298.09	7.241	29.0	1.03	15.98	.58	18.4	3	6.0	15.7	18.7	1300.	75.	9.9	.842	.903	46.	1301	0.0
1299.06	7.249	29.1	.15	29.25	.68	18.5	3	6.0	7.4	8.7	1179.	39.	16.9	.932	.932	26.	1302	0.0
1300.04	7.257	29.0	-.15	36.73	.88	18.5	3	6.0	4.5	5.3	1143.	24.	18.8	.959	.958	18.	1303	0.0
1301.04	7.265	28.0	-1.47	57.70	99.99	18.5	3	6.6	-1.3	-1.0	1000.	-5.	20.3	1.057	.946	0.	1304	69.4
1302.04	7.272	24.7	-4.84	50.90	99.99	18.5	3	9.0	-1.2	-1.0	1000.	-5.	20.3	.933	.933	0.	1305	413.1
1303.04	7.278	21.4	-4.84	44.10	99.99	18.5	3	7.5	-1.0	-1.0	1000.	-5.	20.3	.808	.808	0.	1306	417.3
1304.04	7.284	18.1	-4.84	37.30	99.99	18.5	3	6.2	-.8	-1.0	1000.	-5.	20.3	.684	.684	0.	1307	421.0
1305.05	7.288	14.8	-4.84	30.50	99.99	18.5	2	4.9	-1.0	-1.0	1000.	-5.	20.3	.850	.850	0.	1308	417.8
1306.05	7.292	11.5	-4.84	23.70	99.99	18.5	2	3.7	-.8	-1.0	1000.	-5.	20.3	.660	.660	0.	1309	420.6
1307.05	7.295	8.2	-4.84	16.90	99.99	18.5	2	2.6	-.6	-1.0	1000.	-5.	20.3	.471	.471	0.	1310	422.9
1308.06	7.297	4.9	-4.84	10.10	99.99	18.5	1	1.5	-.6	-1.0	1000.	-5.	20.3	.466	.466	0.	1311	415.3
1309.06	7.297	1.6	-4.84	3.30	99.99	18.5	1	.5	-.2	-1.0	1000.	-5.	20.3	.152	.152	0.	1312	416.6
1310.06	7.298	0.0	-2.35	0.00	11.44	18.5	1	0.0	.0	.3	1000.	2.	20.3	-.000	-.000	4.	1313	162.3
1311.06	7.298	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1314	0.0
1312.06	7.298	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1315	0.0
1313.06	7.298	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1316	0.0
1314.06	7.298	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1317	0.0
1315.06	7.298	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1318	0.0
1316.06	7.298	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1319	0.0
1317.06	7.298	0.0	0.00	0.00	11.44	18.5	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1320	0.0
1318.06	7.298	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1321	0.0
1319.06	7.298	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1322	0.0
1320.06	7.298	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1323	0.0
1321.06	7.298	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1324	0.0
1322.06	7.298	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1325	0.0
1323.06	7.298	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1326	0.0
1324.06	7.298	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1327	0.0
1325.06	7.298	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1328	0.0
1326.06	7.298	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1329	0.0
1327.06	7.298	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1330	0.0
1328.06	7.298	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1331	0.0
1329.06	7.298	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1332	0.0
1330.06	7.298	0.0	0.00	0.00	11.44	18.4	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1333	0.0

DRIVING SCHEDULE (UDC001) USING ROUTE (LEVEL)

SEC.	MILES	MPH	ACC	INST MPG	BSFC	CUM MPG	GEAR	RDLD	HPW	HPE	RPM	TORQ	VAC	SR	ETA	PCT.WOT	SEG	BRAKES
1331.06	7.298	0.0	0.00	0.00	11.44	18.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1334	0.0
1332.06	7.298	0.0	0.00	0.00	11.44	18.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1335	0.0
1333.06	7.298	0.0	0.00	0.00	11.44	18.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1336	0.0
1334.06	7.298	0.0	0.00	0.00	11.44	18.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1337	0.0
1335.06	7.298	1.5	2.20	1.99	.78	18.3	1	.2	1.3	5.8	1000.	30.	18.1	.143	.247	19.	1338	0.0
1336.06	7.299	4.8	4.84	3.90	.56	18.3	1	.6	8.3	13.1	1000.	69.	12.0	.457	.686	40.	1339	0.0
1337.06	7.301	8.1	4.84	4.64	.55	18.3	1	1.1	14.0	18.8	1172.	84.	8.4	.657	.851	50.	1340	0.0
1338.06	7.303	11.4	4.84	5.04	.54	18.3	1	1.6	19.8	25.1	1376.	96.	6.6	.789	.899	57.	1341	0.0
1339.08	7.307	13.2	2.64	8.14	.56	18.3	2	1.9	13.3	17.3	1152.	79.	9.5	.658	.852	47.	1342	0.0
1340.08	7.311	15.1	2.79	7.99	.56	18.2	2	2.3	16.0	20.3	1239.	86.	8.0	.700	.873	51.	1343	0.0
1341.08	7.315	16.8	2.49	8.85	.56	18.2	2	2.6	16.2	20.1	1271.	83.	8.5	.759	.893	50.	1344	0.0
1342.08	7.320	18.3	2.20	9.73	.57	18.2	2	2.9	16.0	19.7	1298.	80.	9.1	.809	.902	48.	1345	0.0
1343.08	7.325	19.5	1.76	11.24	.59	18.2	2	3.2	14.4	17.6	1292.	72.	10.6	.866	.904	44.	1346	0.0
1344.09	7.331	20.3	1.17	14.44	.62	18.2	2	3.4	11.1	13.7	1274.	56.	13.5	.915	.915	36.	1347	0.0
1345.08	7.337	21.3	1.47	12.54	.59	18.2	2	3.7	13.8	17.1	1347.	67.	11.4	.908	.908	42.	1348	0.0
1346.04	7.342	21.9	.88	18.21	.59	18.2	3	3.8	10.1	12.1	1079.	59.	13.7	.767	.895	35.	1349	0.0
1347.05	7.349	22.1	.29	26.05	.68	18.2	3	3.9	5.9	7.4	1000.	39.	17.2	.835	.866	24.	1350	0.0
1348.05	7.355	22.4	.44	24.54	.65	18.2	3	3.9	7.1	8.5	1002.	44.	16.6	.844	.904	27.	1351	0.0
1349.05	7.361	22.0	-.59	40.37	99.99	18.2	3	3.9	-.4	-.1	1000.	-1.	20.3	.831	.831	2.	1352	0.0
1350.04	7.367	21.6	-.59	39.83	99.99	18.2	3	3.8	-.4	-.2	1000.	-1.	20.3	.816	.816	2.	1353	0.0
1351.05	7.373	21.1	-.73	43.48	99.99	18.2	3	3.8	-1.0	-1.0	1000.	-5.	20.3	.797	.797	0.	1354	4.2
1352.05	7.379	20.5	-.88	42.24	99.99	18.3	3	3.7	-1.0	-1.0	1000.	-5.	20.3	.774	.774	0.	1355	20.0
1353.05	7.384	20.0	-.73	41.21	99.99	18.3	3	3.5	-.9	-1.0	1000.	-5.	20.3	.755	.755	0.	1356	5.5
1354.05	7.390	19.6	-.59	37.01	99.99	18.3	3	3.3	-.5	-.4	1000.	-2.	20.3	.740	.740	2.	1357	0.0
1355.05	7.395	18.5	-1.61	38.12	99.99	18.3	3	3.8	-.9	-1.0	1000.	-5.	20.3	.699	.699	0.	1358	95.7
1356.07	7.400	17.5	-1.47	36.06	99.99	18.3	2	3.5	-1.2	-1.0	1000.	-5.	20.3	1.005	.995	0.	1359	75.0
1357.07	7.405	16.5	-1.47	34.00	99.99	18.3	2	3.2	-1.2	-1.0	1000.	-5.	20.3	.947	.947	0.	1360	76.0
1358.07	7.409	15.5	-1.47	31.94	99.99	18.3	2	3.0	-1.1	-1.0	1000.	-5.	20.3	.890	.890	0.	1361	77.0
1359.07	7.413	14.0	-2.20	28.85	99.99	18.3	2	3.1	-1.0	-1.0	1000.	5.	20.3	.804	.804	0.	1362	152.1
1360.07	7.417	11.0	-4.40	22.67	99.99	18.3	2	3.4	-.8	-1.0	1000.	-5.	20.3	.631	.631	0.	1363	376.6
1361.07	7.419	8.0	-4.40	16.49	99.99	18.3	2	2.4	-.6	-1.0	1000.	-5.	20.3	.459	.459	0.	1364	378.7
1362.08	7.421	5.2	-4.11	10.72	99.99	18.3	1	1.5	-.6	-1.0	1000.	-5.	20.3	.495	.495	0.	1365	340.4
1363.08	7.422	2.5	-3.96	5.15	99.99	18.3	1	.7	-.3	-1.0	1000.	-5.	20.3	.238	.238	0.	1366	326.2
1364.08	7.423	0.0	-3.67	0.00	11.44	18.3	1	0.0	.0	.3	1000.	2.	20.3	-.000	-.000	4.	1367	297.4
1365.08	7.423	0.0	0.00	0.00	11.44	18.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1368	0.0
1366.08	7.423	0.0	0.00	0.00	11.44	18.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1369	0.0
1367.08	7.423	0.0	0.00	0.00	11.44	18.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1370	0.0
1368.08	7.423	0.0	0.00	0.00	11.44	18.3	1	0.0	0.0	.3	1000.	2.	20.3	0.000	0.000	4.	1371	0.0

SHIFT FREQUENCY DATA

10/23/78

TOTAL SHIFTS = 112 SHIFTS PER MILE = 15.1 NUMB GEARS = 3

GEAR INTO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
UPSHIFTS	0	19	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOWNSHIFTS	19	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

VEHICLE PERFORMANCE SIMULATION 10/23/78

RUN TITLE = FUEL RUN BUICK 231 WT=3500 8 DRIVING CYCLES 1ST=URBAN

SCHEDULE AVERAGES

FUEL ECONOMY	= 18.26 MPG
WORK PER MILE	= .43 HP-HR/MI
AVG SP FUEL CONS	= .76 LBS/HP-HR
AVG SPEED	= 19.5 MPH

TOTALS

VARIABLE	(UNITS)	TOTAL AMOUNT	PERCENT OF TOTAL (CRUISE	ACCEL	DECEL	IDLE)	(BRAKES)
TIME	(SECS)	1368.1	8.0	39.6	34.6	17.8	
DISTANCE	(MILES)	7.4	12.1	46.8	41.1	0.0	
ENERGY	(HP-HR)	3.18	8.4	83.3	7.6	.6	
FUEL	(LBS)	2.43	8.0	61.6	20.9	9.6	9.3

ENERGY SUPPLY

	HP-HR
(1) ENGINE	= 3.18
(2) KINETIC ENERGY	= 0.00
(3) POTENTIAL ENERGY	= 0.00
(4) ROTATING INERTIA	= 0.00

BREAKDOWN

	PERCENT ENGINE HP-HR
(1) ACCESSORIES	= 5.42
(2) TORQUE CONVERTER	= 10.69
(3) GEAR BOX	= .73
(4) DIFFERENTIAL	= 3.52
(5) TIRE SLIP	= 5.93
3+4+5	= 10.18
2+3+4+5	= 20.87
(6) AERODYNAMIC DRAG	= 16.70
(7) ROLLING RESIST	= 32.13
SUBTOTAL 1- 7	= 75.13
(8) BRAKES	= 22.07
(9) ENGINE MOTORING	= 2.94
SUBTOTAL 1- 9	= 100.13
(10) OTHER ENERGY	= 0.00
TOTAL 1-10	= 100.13

ADDITIONAL RUN DATA

DRIVING SCHEDULE NAME	= UDC001	ROUTE NAME	= LEVEL
VEHICLE NAME	= B3500	ENGINE NAME	= F7BDC7
CONVERTER NAME	= CODY2	SHIFT LOGIC NAME	= TEST2
WEIGHT (LBS)	= 3500.	STROKE (INCHES)	= 3.40
DISPLACEMENT (CU IN)	= 231.4	REAR AXLE RATIO	= 2.56
WIND VELOCITY (MPH)	= 0.0	FUEL DENSITY (LB/GAL)	= 5.98
AERO DRAG = 19.04 , .51		TIRES = 12.00 , .09 , .93	

S C O P E   L O A D   M A P

LOADER VERSION 1.0   04/24/79   16.16.13.   PAGE 1

PROGRAM WILL BE ENTERED AT VSIME (101300)

SCM LENGTH 136541   LCM LENGTH 0

BLOCK	ADDRESS	LENGTH	FILE
/FLAGS/	111	1	LGO
/CDDATA/	112	35711	LGO
/OUTPUT/	35C22	21	LGO
/PARM/	35043	2	LGO
/SGDATA/	35045	43121	LGO
VSIME	101166	25323	LGO
ABORT	1255[illegible]	1[illegible]	LGO
ABORT1	126612	23	LGO
ABORT2	126635	27	LGO
ABORT3	125664	31	LGO
ABORT4	125715	31	LGO
ABORT5	126746	31	LGO
ABORT6	125777	31	LGO
ABORT7	127030	25	LGO
ABORT8	127055	27	LGO
ABORT9	127104	31	LGO
ABORTA	127135	31	LGO
CARDCU	127166	767	LGO
CYCLE	130155	154	LGO
FIND	130326	67	LGO
ICAFB	130415	143	LGO
/STP.END/	13056[illegible]	1	SL-FCRTX
/FCL.C./	13056[illegible]	23	SL-FCRTX
/QE.IO./	130604	135	SL-FCRTX
J8NTRY=	130742	1	SL-FCRTX
BACKSP=	130743	[illegible]	SL-FCRTX
COMIO=	131[illegible]4	[illegible]	SL-FCRTX
ENDFIL=	131[illegible]74	4[illegible]	SL-FCRTX
EOF	13[illegible]41	2	SL-FCRTX
FCCMSK=	13[illegible]	41	SL-FCRTX
FLTIN=	13[illegible]	1[illegible]0	SL-FCRTX
FLTOUT=	13[illegible]40[illegible]	31[illegible]	SL-FCRTX
FMTAP=	13[illegible]7[illegible]	373	SL-FCRTX
FORSYS=	132[illegible]	[illegible]33	SL-FCRTX
FCRUTL=	133043	44	SL-FCRTX
GETFIT=	1331[illegible]7	43	SL-FCRTX
INCOM=	133[illegible]	[illegible]62	SL-FCRTX
/IO.BUF./	133434	227	SL-FCRTX
INPB=	133[illegible]	3[illegible]4	SL-FCRTX
INPC=	13[illegible]7	173	SL-FCRTX
KODER=	134[illegible]	467	SL-FCRTX
KRAKER=	13[illegible]7[illegible]	43[illegible]	SL-FCRTX
OUTB=	13[illegible]	[illegible]	SL-FCRTX
OUTC=	13[illegible]743	174	SL-FCRTX
OUTCOP=	13[illegible]37	[illegible]4	SL-FCRTX
CLOCK=	13[illegible]34[illegible]	[illegible]	SL-FCRTX
SYSAID=	13[illegible]42[illegible]	[illegible]	SL-FCRTX
FTNKPV=	13[illegible]42[illegible]	120	SL-FCRTX

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PROGRAM VSIM
RUN ON  04/24/79  AT  18.16.13.

 VEHICLE NAME      SPEED DATA     LOAD DATA
      BUICK        PISTON SPEED     TORQUE

1977 BUICK, 231 ENGINE, CID=231, STROKE=3, CATALYTIC CONVERTER
CID=231.0   STROKE=3.000
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SAMPLED DATA FROM DRIVING CYCLE (TAPE19)

CUMT	CUMD	CUMFU	HPE	RPME	TORQE	VAC	PCT THR	SEG
1.0000	0.0000	.0010	.3008	1000.0000	1.5800	20.3000	3.6589	1
49.2853	.1396	.0776	3.8295	1000.0000	20.1127	18.9991	13.6604	50
99.4451	.4577	.1707	16.3989	1282.2700	67.1678	11.4677	41.5506	100
149.5388	.6705	.2317	.3008	1000.0000	1.5800	20.3000	3.6589	150
199.7572	.9130	.3686	52.0957	1853.5571	147.6116	2.4852	81.8544	200
249.7280	1.6324	.5855	16.0110	2172.0039	38.7153	14.3625	33.4654	250
299.2970	2.3594	.7547	8.4569	1911.2077	23.2727	17.2792	24.1376	300
349.1533	2.6293	.8056	24.1453	1342.0641	94.4895	6.7272	55.9598	350
399.0605	2.9915	.9171	.3008	1000.0000	1.5800	20.3000	3.6589	400
449.0136	3.1361	1.0029	22.0975	1283.9548	90.3897	7.3108	53.6824	450
498.9725	3.5717	1.1221	-.9901	1000.0000	-5.2000	20.3000	0.0000	500
548.9671	3.7671	1.1972	-.9901	1000.0000	-5.2000	20.3000	0.0000	550
598.5317	3.9307	1.2655	9.4488	1014.0576	48.9365	15.7995	29.3606	600
648.5799	4.0477	1.3302	19.8575	1344.5277	77.5674	9.4322	47.2364	650
698.5129	4.2190	1.4065	20.8248	1417.3363	77.1673	9.4377	47.2211	700
748.5651	4.4665	1.5040	3.5428	1092.4765	17.0318	19.4246	13.1323	750
798.3309	4.7497	1.5909	13.2197	1190.0709	58.3410	13.4647	36.0967	800
847.2055	5.1360	1.6791	20.9504	1594.6646	68.8351	10.5988	43.5951	850
897.2540	5.5186	1.7590	-.7257	1000.0000	-3.8113	20.3000	.7495	900
947.3255	5.8620	1.8256	-.9901	1000.0000	-5.2000	20.3000	0.0000	950
997.4203	6.1305	1.9128	15.9129	1444.6614	57.8506	12.8255	37.5516	1000
1047.3285	6.2542	1.9636	.3008	1000.0000	1.5800	20.3000	3.6589	1050
1097.2890	6.4622	2.0424	.3008	1000.0000	1.5800	20.3000	3.6589	1100
1147.0441	6.7365	2.1221	-.9901	1000.0000	-5.2000	20.3000	0.0000	1150
1197.0269	6.8092	2.1904	14.4429	1044.4957	72.0229	11.0634	42.3873	1200
1247.0058	7.0045	2.2569	.3008	1000.0000	1.5800	20.3000	3.6589	1250
1297.0897	7.2329	2.3427	14.6631	1225.1251	63.6648	12.3231	39.2270	1300
1347.0541	7.3485	2.4111	7.4478	1000.0000	39.1159	17.2198	23.9159	1350

EMISSIONS GENERATED DURING DRIVING CYCLE

TIME SECONDS	DISTANCE MILES	RPM	TORQUE	INSTANTANEOUS (GRAMS) HC	CO	NOX	CUMULATIVE (GRAMS) HC	CO	NOX	RATE (GRAMS/MILE) HC	CO	NOX
1.00	0.0000	[illegible]	1.536	.0034	.0002	.0009	.00	.0002	.0001			
2.00	0.0000	[illegible]	[illegible]	.0042	.0002	.0009	.00	.0004	.0002			
3.00	0.0000	[illegible]	1.536	.0034	.0002	.0009	.00	.0006	.0003			
4.00	0.0000	[illegible]	1.536	.0034	.0002	.0009	.00	.0008	.0004			
5.00	0.0000	[illegible]	[illegible]	.0042	.0002	.0009	.00	.0010	.0005			
6.00	0.0000	[illegible]	1.536	.0034	.0002	.0009	.00	.0012	.0006			
7.00	0.0000	[illegible]	1.536	.0034	.0002	.0009	.00	.0014	.0007			
8.00	[illegible]	[illegible]	[illegible]	.0042	.0002	.0009	.00	.0016	.0008			
9.00	[illegible]	[illegible]	[illegible]	.0042	.0002	.0009	.00	.0018	.0009			
10.00	[illegible]	[illegible]	1.536	.0034	.0002	.0009	.00	.0020	.0010			
11.00	[illegible]	[illegible]	1.536	.0034	.0002	.0009	.00	.0021	.0011			
12.00	[illegible]	[illegible]	[illegible]	.0042	.0002	.0009	.00	.0023	.0012			
13.00	0.0000	[illegible]	1.536	.0034	.0002	.0009	.00	.0025	.0013			
14.00	[illegible]	[illegible]	1.536	.0034	.0002	.0009	.00	.0027	.0014			
15.00	[illegible]	[illegible]	[illegible]	.0042	.0002	.0009	.00	.0029	.0015			
16.00	0.0000	[illegible]	1.536	.0034	.0002	.0009	.00	.0031	.0016			
17.00	[illegible]	[illegible]	1.536	.0034	.0002	.0009	.00	.0032	.0017			
18.00	[illegible]	[illegible]	[illegible]	.0042	.0002	.0009	.00	.0034	.0018			
19.00	0.0000	[illegible]	1.536	.0034	.0002	.0009	.00	.0036	.0019			
20.00	[illegible]	[illegible]	[illegible]	.0042	.0002	.0009	.00	.0038	.0020			
21.01	.0004	[illegible]	26.[illegible]	.[illegible]	.[illegible]	.[illegible]	.00	.0040	.0021			
22.01	.0017	[illegible]	69.048	.[illegible]	.[illegible]	.[illegible]	.01	.0043	.0022			
23.01	.0037	[illegible]	73.973	.[illegible]	.[illegible]	.[illegible]	.01	.0046	.0024			
24.01	.0065	[illegible]	67.403	.[illegible]	.[illegible]	.[illegible]	.01	.0051	.0026			
25.01	.0100	[illegible]	95.[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0058	.0031			
26.01	.0144	[illegible]	90.364	.0014	.0003	.0030	.01	.0062	.0033			
27.01	.0179	[illegible]	36.[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0065	.0035			
28.75	.0279	[illegible]	35.324	.0007	.[illegible]	.[illegible]	.01	.0066	.0038			
29.75	.0328	[illegible]	121.[illegible]	.0010	.000[illegible]	.[illegible]	.01	.0066	.0050			
30.80	.0384	[illegible]	[illegible]	.[illegible]	.[illegible]	.0100	.01	.0066	.0060			
31.80	.0443	[illegible]	[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0066	.0072			
32.39	.0484	[illegible]	34.[illegible]	.[illegible]	.0002	.0043	.01	.0066	.0074			
33.39	.0504	[illegible]	-[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0066	.0074			
34.39	.0523	[illegible]	-[illegible]	.0010	.0000	.0008	.01	.0066	.0074			
35.39	.0564	[illegible]	-[illegible]	.0010	.0000	.0008	.01	.0066	.0074			
36.39	.0604	[illegible]	-[illegible]	.0010	.0000	.0008	.01	.0066	.0074			
37.40	.0645	[illegible]	-[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0066	.0074			
38.40	.0686	[illegible]	-[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0066	.0074			
39.40	.0726	[illegible]	[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0066	.0077			
40.40	.0767	[illegible]	[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0066	.0080			
41.40	.0808	[illegible]	[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0066	.0083			
42.40	.0849	[illegible]	[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0066	.0086			
43.40	.0889	[illegible]	[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0066	.0089			
44.40	.0930	[illegible]	[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0066	.0092			
45.40	.0971	[illegible]	103.[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0066	.0095			
46.40	.1012	[illegible]	[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0066	.0098			
47.40	.1052	[illegible]	[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0066	.0101			
48.40	.1093	[illegible]	[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0066	.0104			
49.40	.1134	[illegible]	[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0066	.0107			
50.40	.1175	[illegible]	[illegible]	.[illegible]	.[illegible]	.[illegible]	.01	.0066	.0110			

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EMISSIONS GENERATED DURING DRIVING CYCLE

TIME SECONDS	DISTANCE MILES	RPM	TORQUE	INSTANTANEOUS (GRAMS) HC	CO	NOX	CUMULATIVE (GRAMS) HC	CO	NOX	RATE (GRAMS/MILE) HC	CO	NOX
51.28	.1513	1000.0	-5.200	.0010	0.0000	.0008	.05	.0110	.348	.33	.07	2.30
52.30	.1564	1000.0	-5.200	.0010	0.0000	.0008	.05	.0110	.349	.33	.07	2.23
53.30	.1610	1000.0	-5.200	.0010	0.0000	.0008	.05	.0110	.350	.32	.07	2.17
54.30	.1653	1000.0	16.378	.0007	.0003	.0020	.05	.0113	.352	.32	.07	2.13
55.37	.1703	1336.9	91.885	.0010	.0006	.0176	.05	.0118	.370	.32	.07	2.17
56.37	.1755	1447.1	103.379	.0010	.0005	.0265	.05	.0123	.396	.31	.07	2.26
57.37	.1813	1472.3	97.255	.0010	.0004	.0231	.06	.0127	.420	.31	.07	2.31
58.36	.1875	1504.2	94.144	.0011	.0004	.0219	.06	.0131	.441	.30	.07	2.35
59.34	.1939	1245.9	81.874	.0009	.0005	.0121	.06	.0136	.454	.30	.07	2.34
60.34	.2006	1095.6	53.192	.0006	.0003	.0141	.06	.0139	.468	.29	.07	2.33
61.34	.2075	1071.1	47.606	.0006	.0003	.0129	.06	.0141	.481	.29	.07	2.32
62.31	.2143	1029.5	35.627	.0005	.0003	.0078	.06	.0144	.488	.28	.07	2.28
63.31	.2211	1000.0	.639	.0011	.0002	.0009	.06	.0146	.489	.28	.07	2.21
64.29	.2276	1000.0	21.271	.0006	.0003	.0028	.06	.0148	.492	.27	.07	2.16
65.30	.2347	1037.2	42.306	.0006	.0003	.0115	.06	.0151	.504	.26	.06	2.15
66.27	.2414	1022.5	35.667	.0005	.0003	.0078	.06	.0154	.511	.26	.06	2.12
67.25	.2482	1000.0	21.397	.0006	.0003	.0028	.06	.0157	.514	.25	.06	2.07
68.23	.2549	1000.0	21.334	.0006	.0003	.0028	.06	.0159	.517	.25	.06	2.03
69.23	.2617	1000.0	28.389	.0006	.0003	.0049	.06	.0162	.522	.25	.06	1.99
70.26	.2688	1137.6	58.801	.0007	.0003	.0136	.07	.0165	.535	.24	.06	1.99
71.26	.2759	1151.0	59.604	.0007	.0003	.0129	.07	.0168	.548	.24	.06	1.99
72.24	.2828	1054.1	36.331	.0006	.0003	.0079	.07	.0171	.556	.24	.06	1.97
73.24	.2899	1000.0	8.205	.0011	.0003	.0012	.07	.0173	.558	.23	.06	1.92
74.25	.2969	1000.0	-4.949	.0010	.0000	.0008	.07	.0173	.558	.23	.06	1.88
75.32	.3044	1029.5	35.627	.0006	.0003	.0086	.07	.0176	.567	.23	.06	1.86
76.33	.3114	1126.0	54.318	.0007	.0003	.0137	.07	.0179	.581	.22	.06	1.85
77.33	.3186	1192.9	64.836	.0008	.0003	.0120	.07	.0182	.593	.22	.06	1.86
78.33	.3258	1047.4	29.382	.0006	.0003	.0054	.07	.0185	.598	.22	.06	1.84
79.33	.3330	1000.4	8.161	.0011	.0003	.0012	.07	.0188	.599	.22	.06	1.80
80.38	.3405	1137.5	55.327	.0007	.0003	.0138	.07	.0190	.613	.21	.06	1.80
81.38	.3479	1210.5	65.960	.0006	.0003	.0116	.07	.0193	.625	.21	.06	1.80
82.38	.3554	1284.8	77.668	.0009	.0004	.0116	.07	.0197	.637	.21	.06	1.79
83.49	.3640	1741.9	74.852	.0012	.0003	.0175	.08	.0200	.654	.21	.05	1.80
84.41	.3714	1366.5	75.976	.0009	.0003	.0106	.08	.0203	.665	.21	.05	1.79
85.41	.3797	1267.9	65.229	.0009	.0003	.0105	.08	.0206	.675	.20	.05	1.78
86.41	.3880	1244.1	53.251	.0007	.0003	.0099	.08	.0209	.685	.20	.05	1.77
87.41	.3964	1254.5	53.465	.0007	.0003	.0096	.08	.0212	.695	.20	.05	1.75
88.41	.4049	1264.9	53.733	.0007	.0003	.0093	.08	.0214	.704	.20	.05	1.74
89.41	.4134	1223.5	33.036	.0006	.0003	.0064	.08	.0217	.710	.19	.05	1.72
90.42	.4220	1207.5	19.024	.0007	.0003	.0035	.08	.0220	.714	.19	.05	1.69
91.40	.4303	1198.6	25.626	.0006	.0003	.0047	.08	.0223	.718	.19	.05	1.67
92.39	.4385	1192.8	25.544	.0006	.0003	.0046	.08	.0225	.723	.19	.05	1.65
93.36	.4468	1224.3	39.943	.0006	.0003	.0077	.08	.0228	.731	.19	.05	1.64
94.35	.4552	1284.7	51.267	.0008	.0003	.0095	.08	.0231	.740	.18	.05	1.63
95.35	.4637	1183.3	4.564	.0011	.0001	.0014	.08	.0232	.742	.18	.05	1.60
96.35	.4721	1000.0	-1.973	.0011	.0001	.0009	.09	.0233	.743	.18	.05	1.57
97.34	.4803	1146.3	3.932	.0011	.0001	.0013	.09	.0234	.744	.18	.05	1.55
98.44	.4893	1233.3	52.952	.0008	.0003	.0112	.09	.0237	.755	.18	.05	1.54
99.45	.4977	1262.3	67.163	.0009	.0003	.0103	.09	.0240	.765	.18	.05	1.54
1367.08	7.4227	1000.0	1.580	.0012	.0002	.0009	1.25	.4177	12.513	.17	.06	1.69
1368.08	7.4227	1000.0	1.580	.0012	.0002	.0009	1.25	.4178	12.514	.17	.06	1.69

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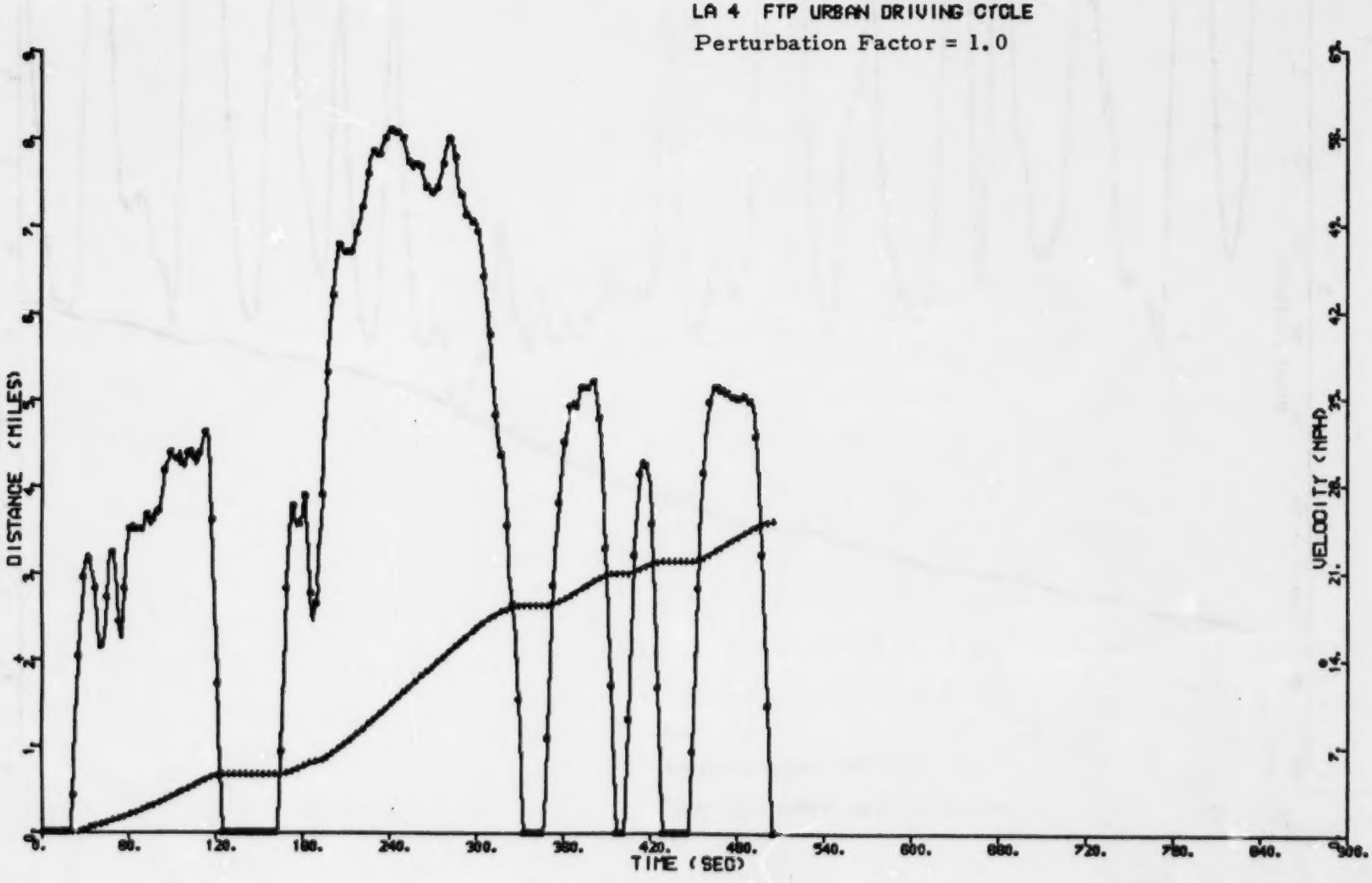
1977 BUICK, 231 ENGINE, CID=231, STROKE=3, CATALYTIC CONVERTER

EMISSIONS GENERATED DURING DRIVING CYCLE

TIME SECONDS	DISTANCE MILES	CUMULATIVE(GRAMS) HC	CO	NOX	RATE(GRAMS/MILE) HC	CO	NOX
1358.00	7.4227	1.25	4.76	12.514	.16867	.05629	1.68596

APPENDIX B

BASELINE AND PERTURBED DRIVING CYCLE PLOTS



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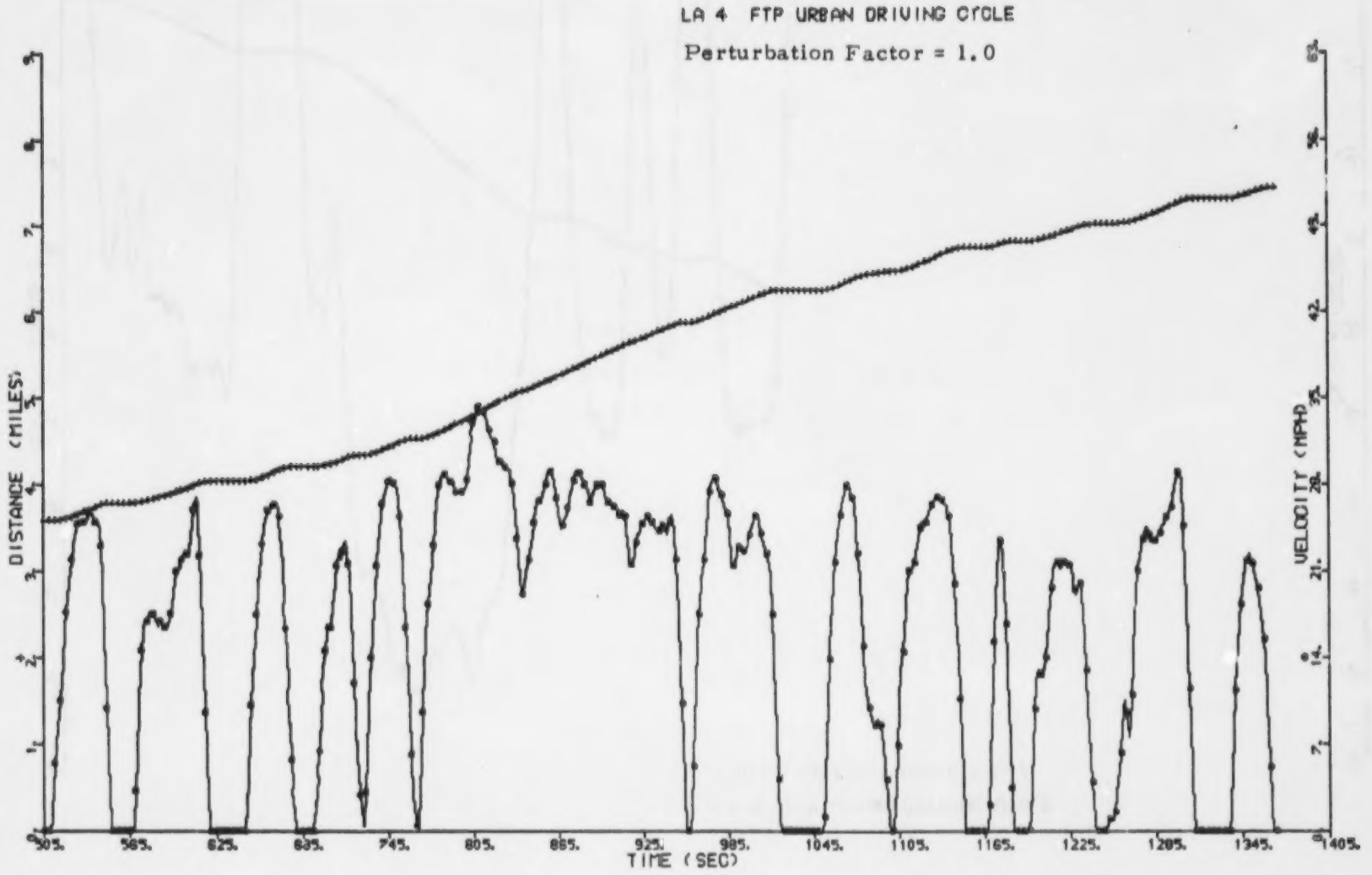
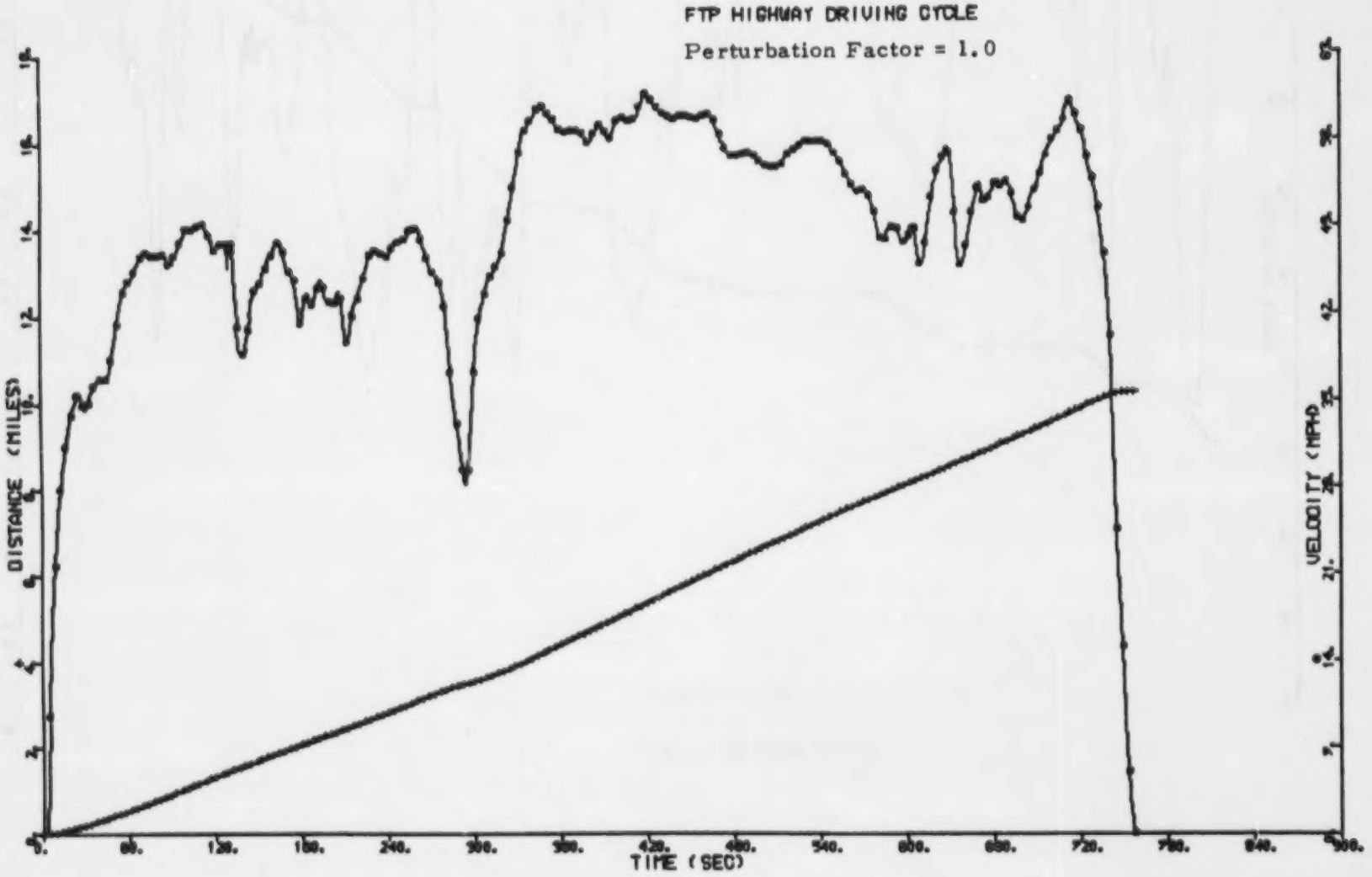
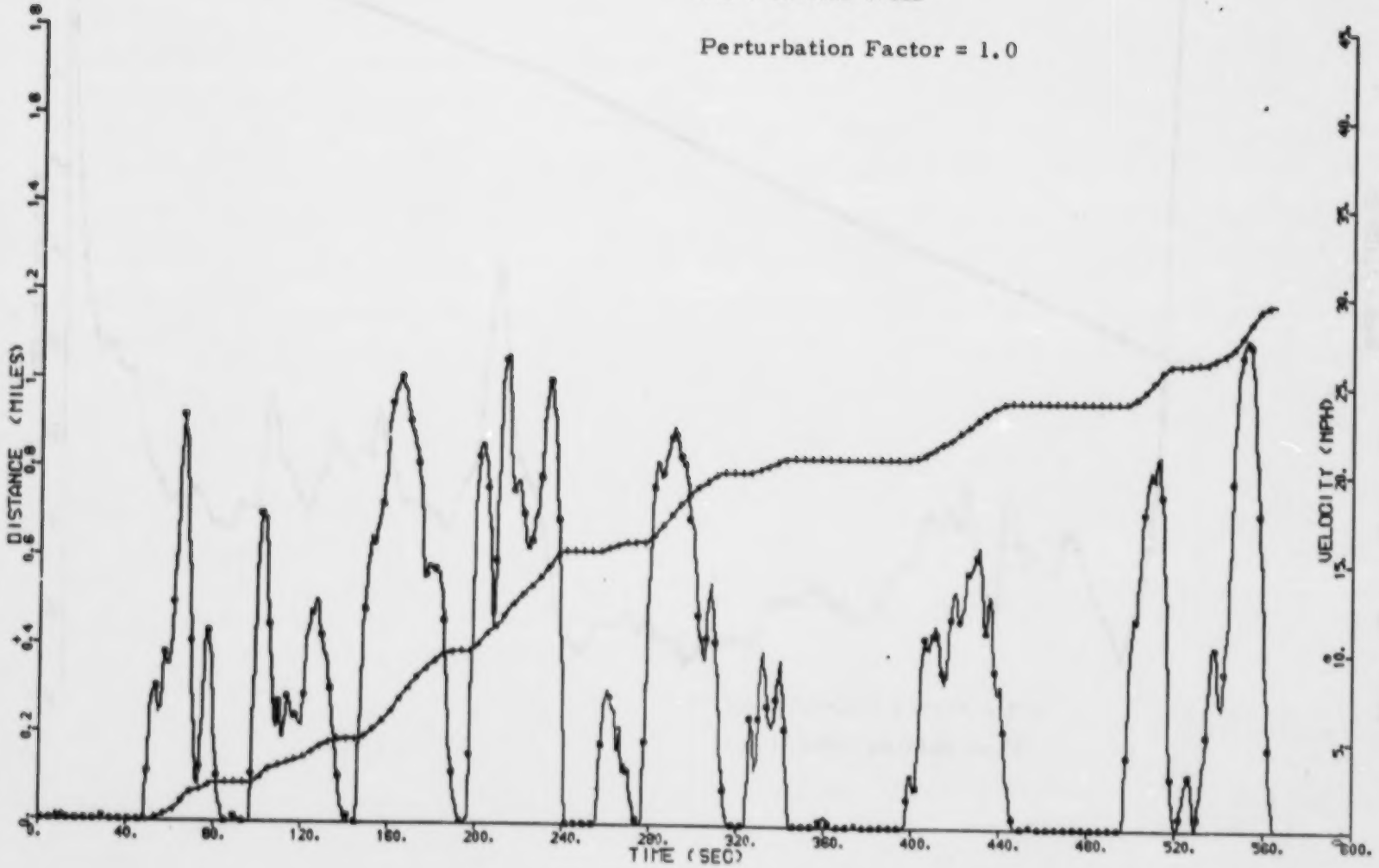

LA 4 FTP URBAN DRIVING CYCLE
Perturbation Factor = 1.0
DISTANCE (MILES)
VELOCITY (MPH)
TIME (SEC)
505.
565.
625.
685.
745.
805.
865.
925.
985.
1045.
1105.
1165.
1225.
1285.
1345.
1405.


FTP HIGHWAY DRIVING CYCLE
Perturbation Factor = 1.0
DISTANCE (MILES)
VELOCITY (MPH)
TIME (SEC)
0.
60.
120.
180.
240.
300.
360.
420.
480.
540.
600.
660.
720.
780.
840.
900.

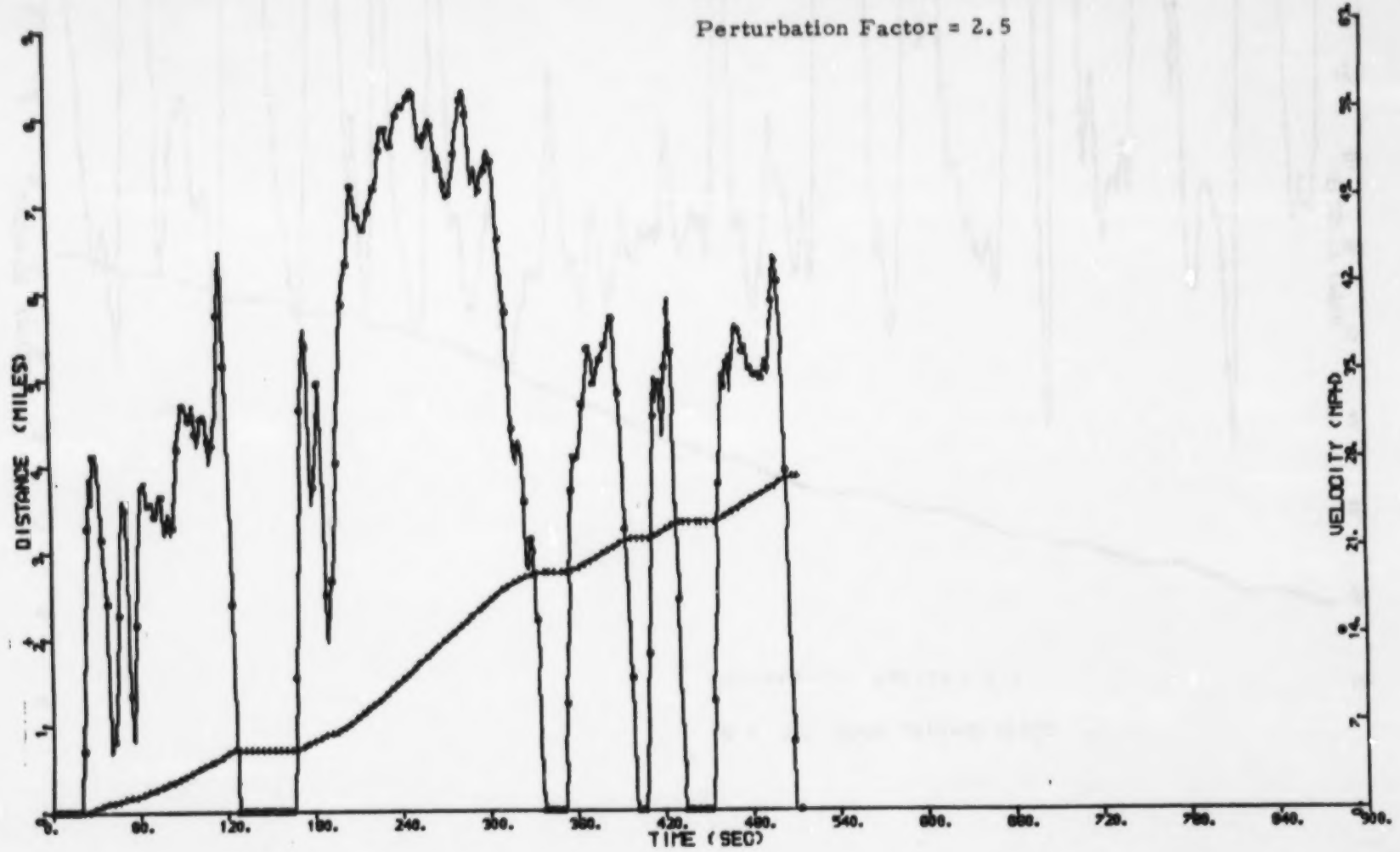
NYC-1 DRIVING CYCLE

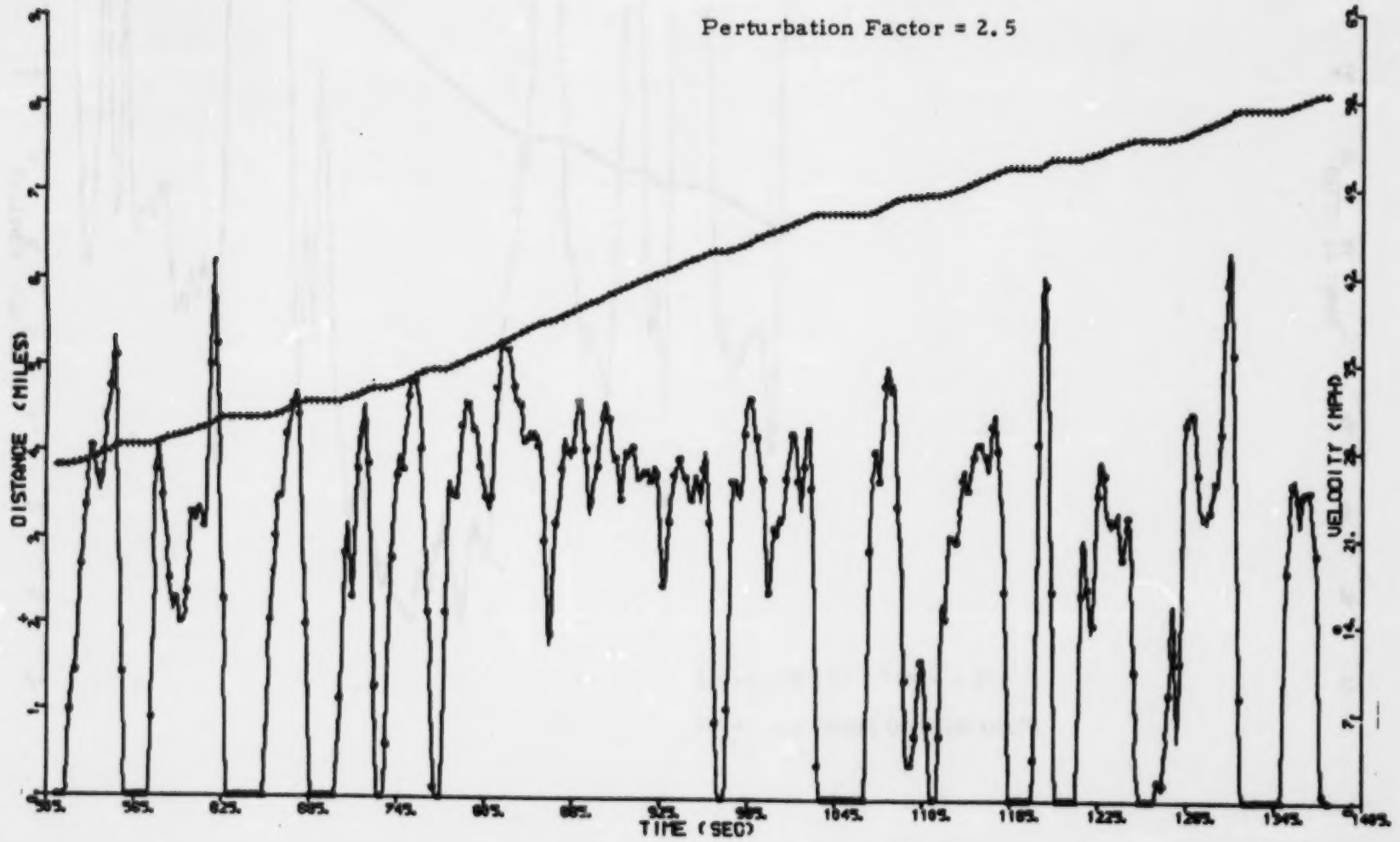
Perturbation Factor = 1.0

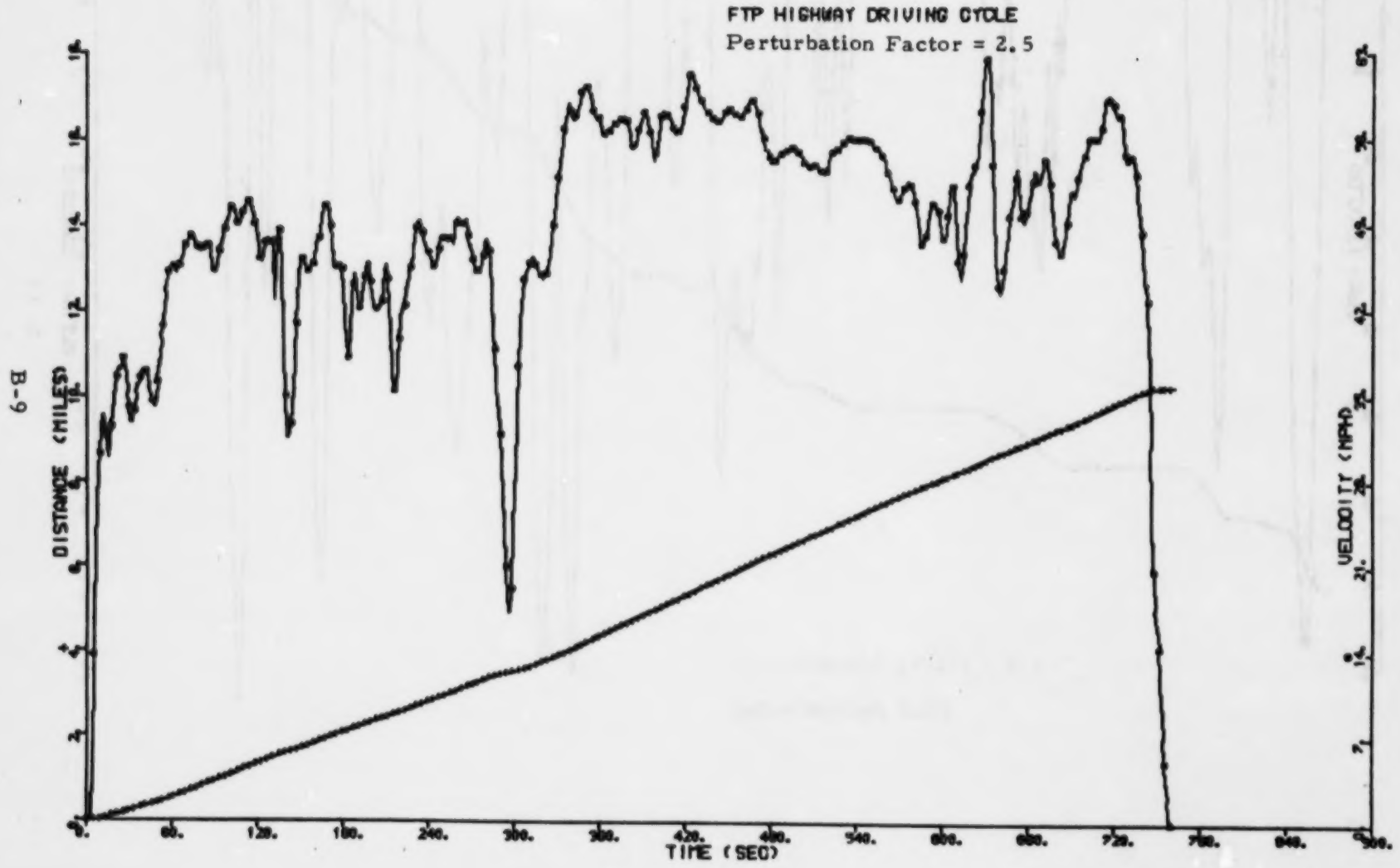


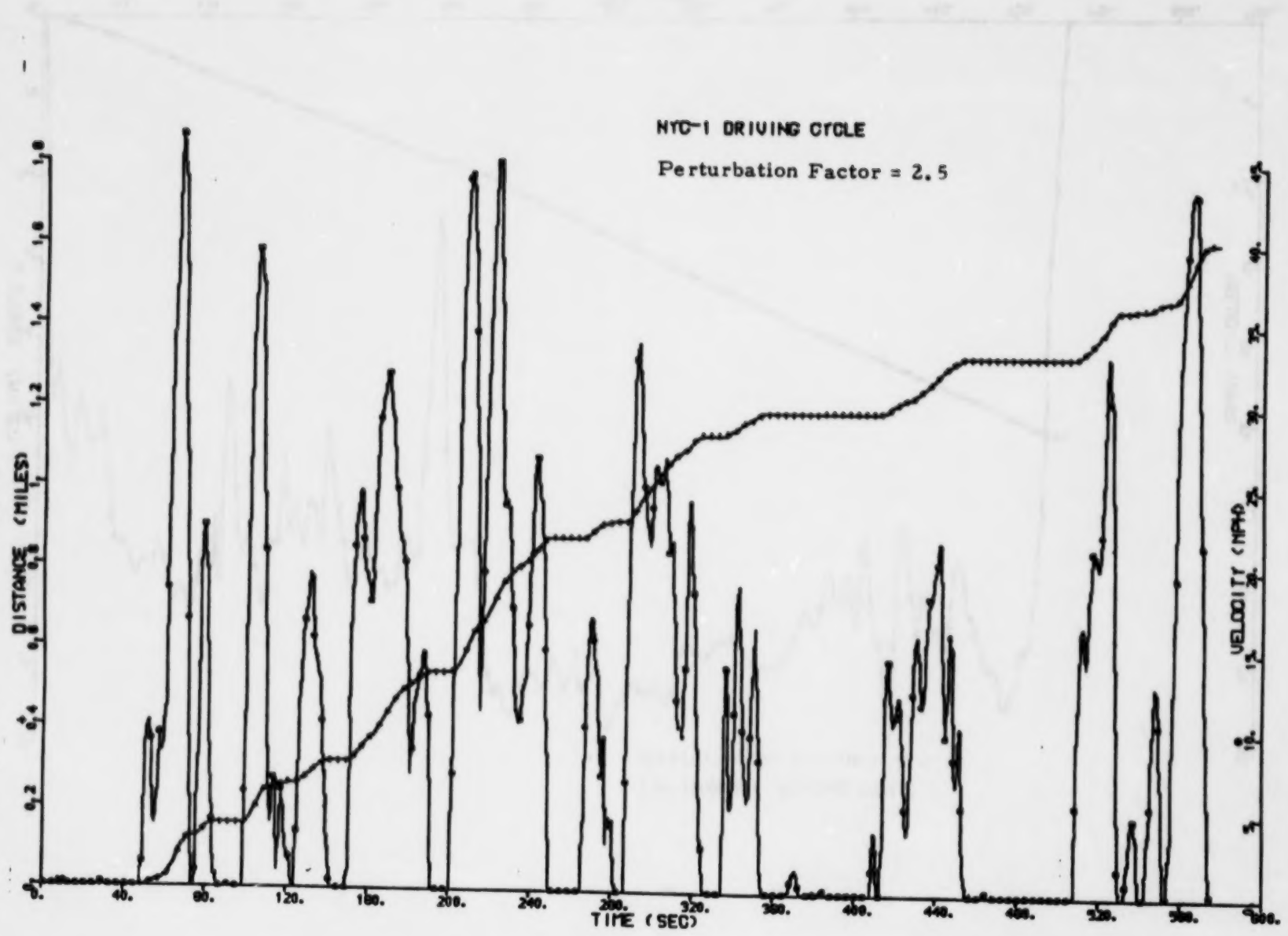
LA 4 FTP URBAN DRIVING CYCLE

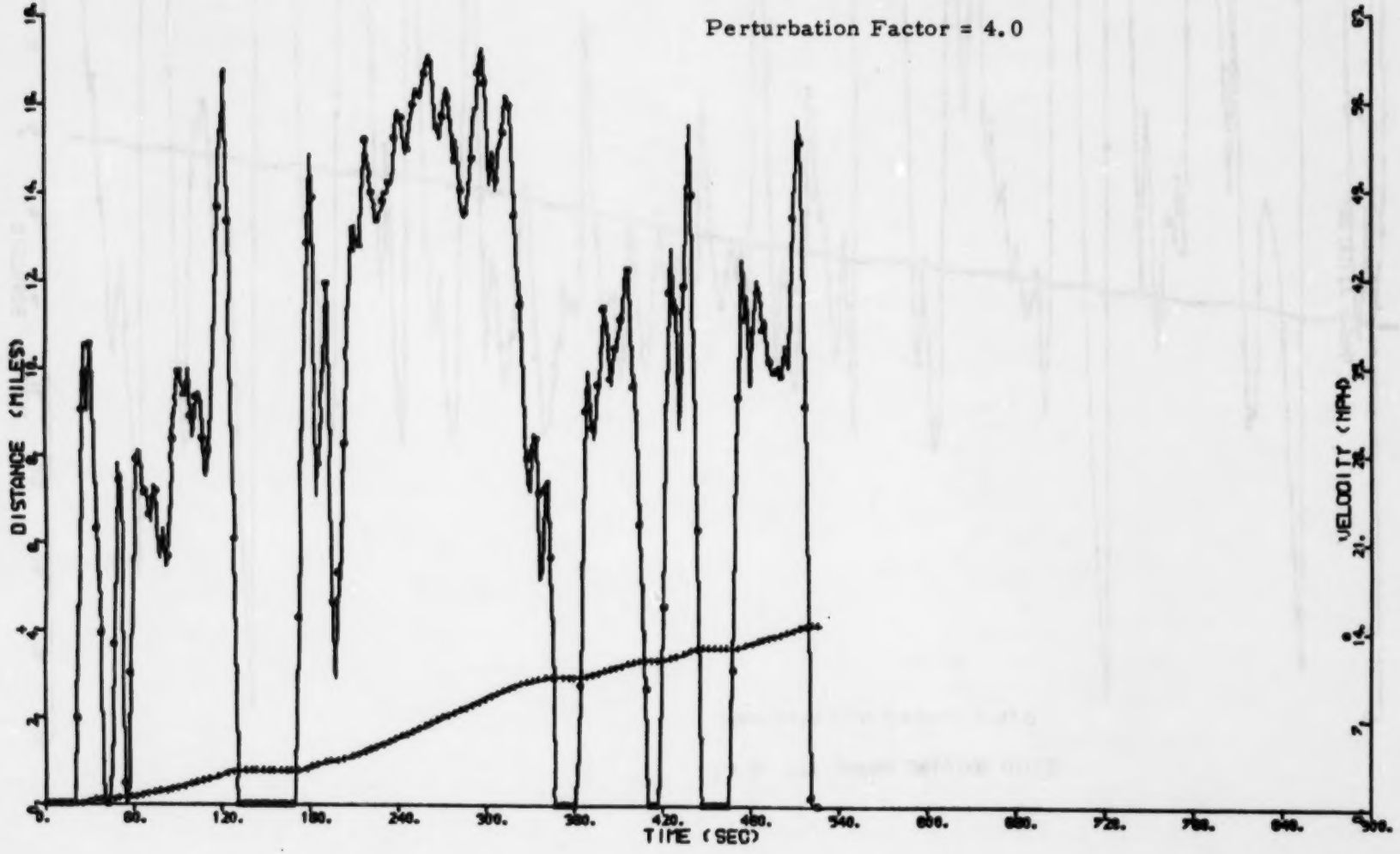
Perturbation Factor = 2.5

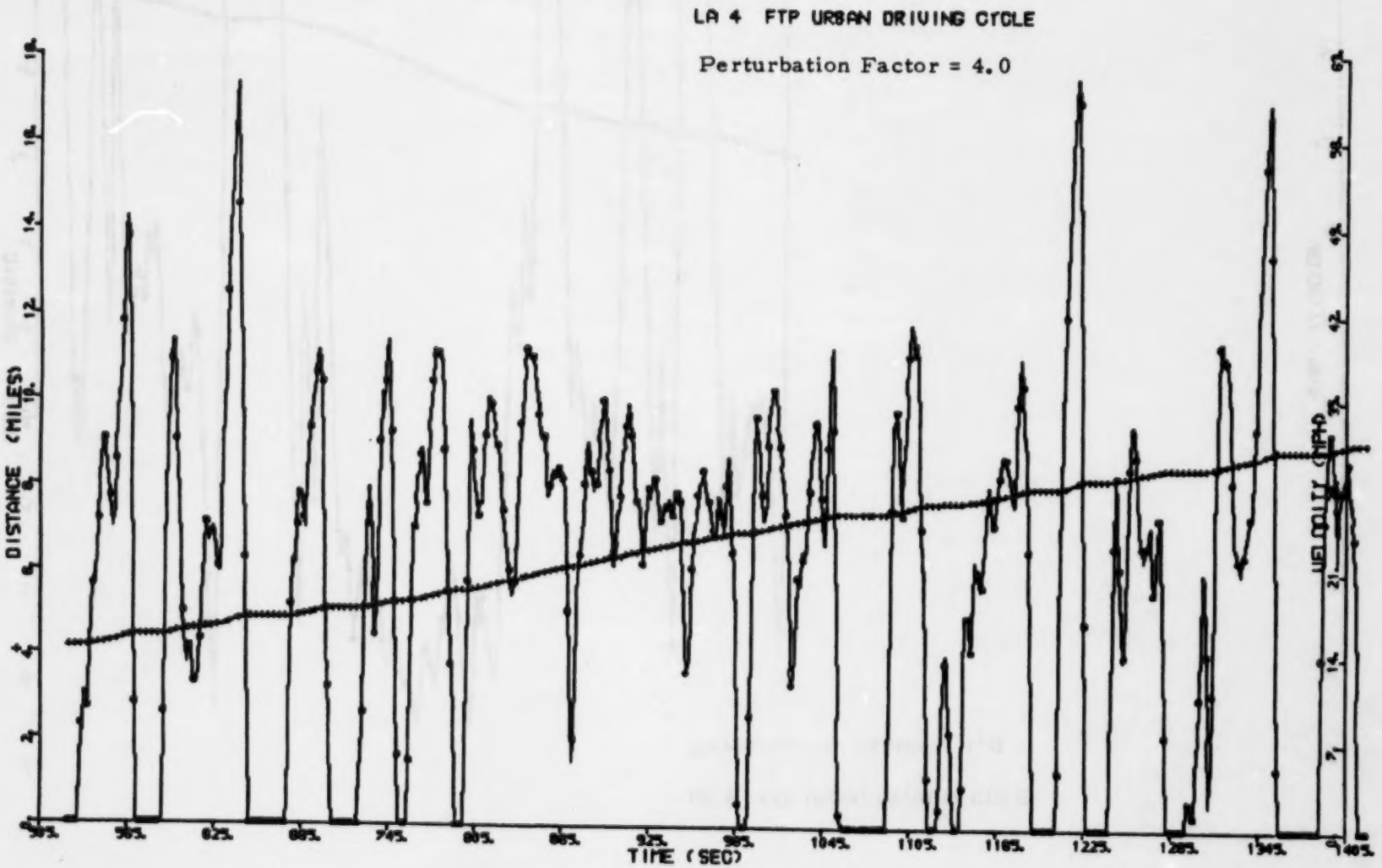


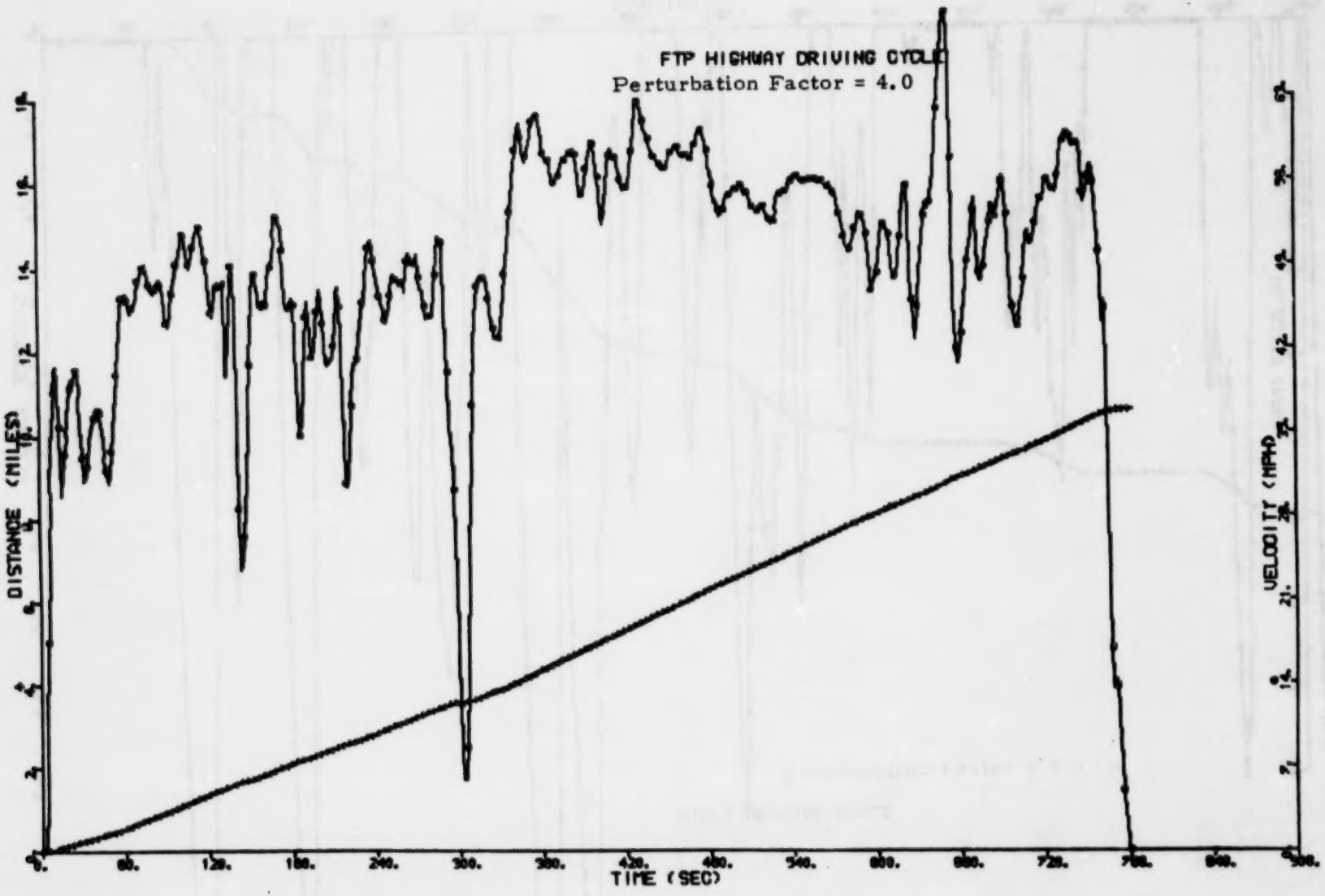

LA 4 FTP URBAN DRIVING CYCLE
Perturbation Factor = 2.5
DISTANCE (MILES)
VELOCITY (MPH)
TIME (SEC)

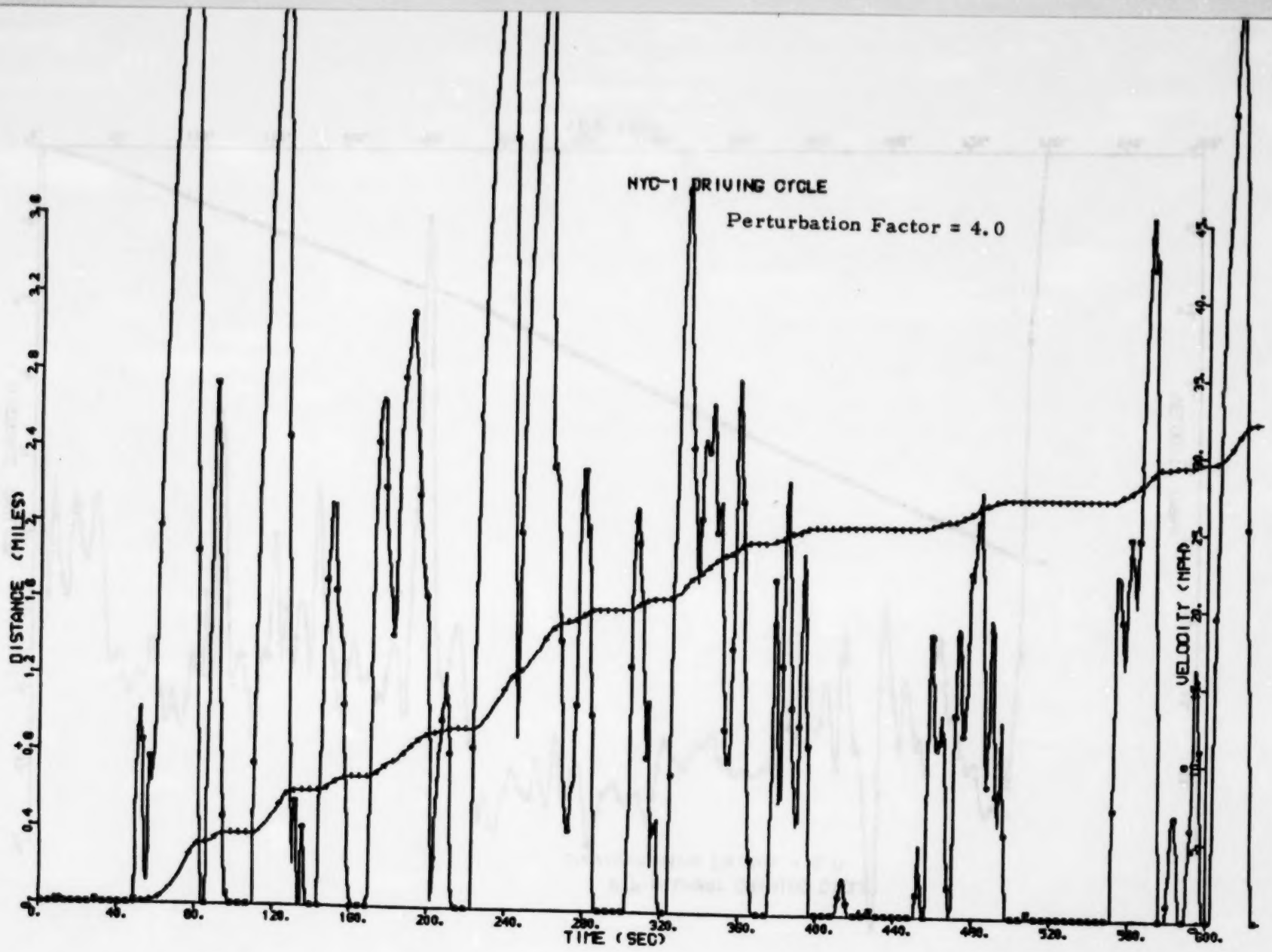

FTP HIGHWAY DRIVING CYCLE
Perturbation Factor = 2.5
DISTANCE (MILES)
VELOCITY (MPH)
TIME (SEC)


NYC-1 DRIVING CYCLE
Perturbation Factor = 2.5
DISTANCE (MILES)
VELOCITY (MPH)
TIME (SEC)
0.
40.
80.
120.
160.
200.
240.
280.
320.
360.
400.
440.
480.
520.
560.
600.


LA 4 FTP URBAN DRIVING CYCLE
Perturbation Factor = 4.0
DISTANCE (MILES)
VELOCITY (MPH)
TIME (SEC)
0.
60.
120.
180.
240.
300.
360.
420.
480.
540.
600.
660.
720.
780.
840.
900.

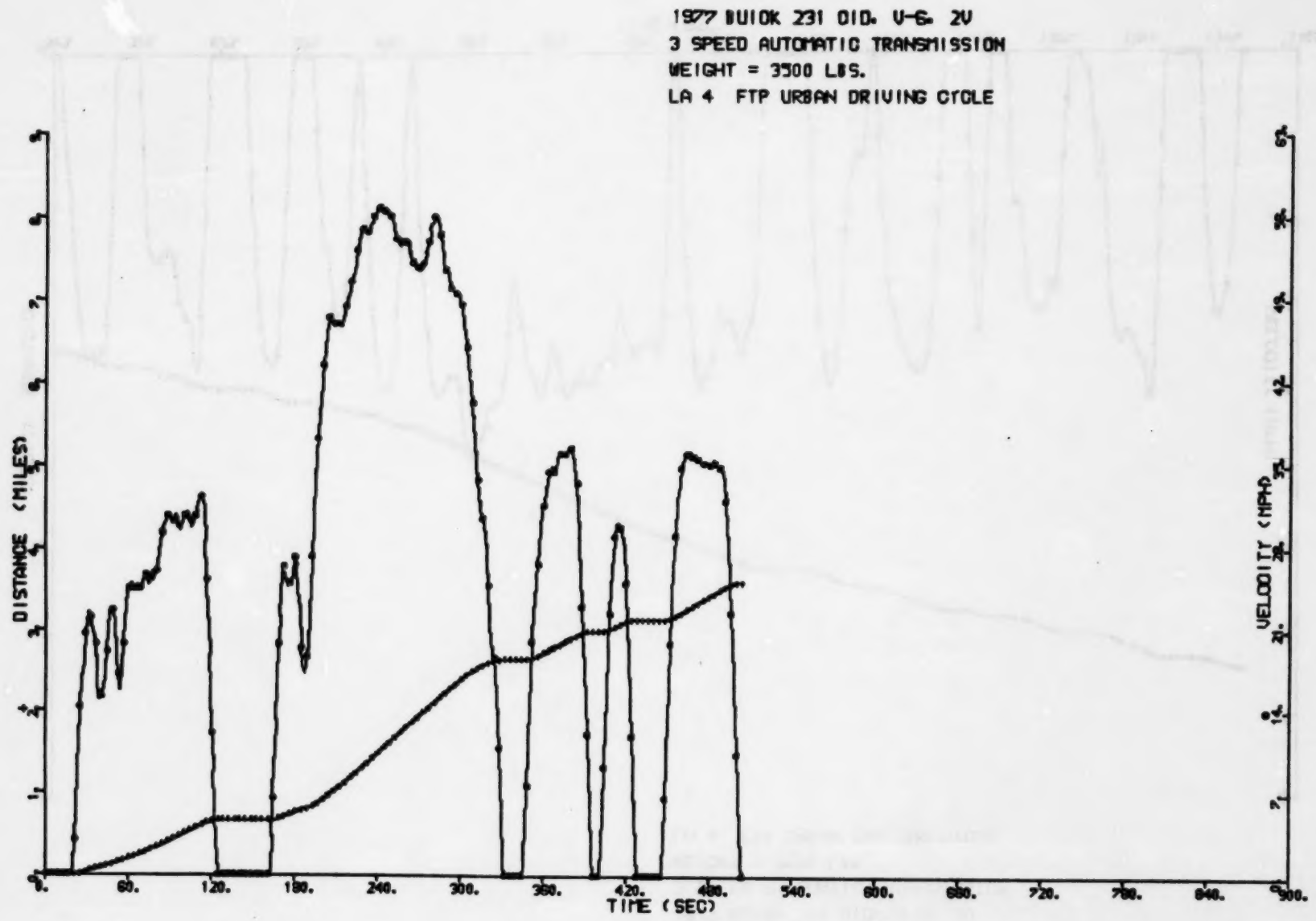

LA 4 FTP URBAN DRIVING CYCLE
Perturbation Factor = 4.0
DISTANCE (MILES)
VELOCITY (MPH)
TIME (SEC)


FTP HIGHWAY DRIVING CYCLE
Perturbation Factor = 4.0
DISTANCE (MILES)
VELOCITY (MPH)
TIME (SEC)
0.
60.
120.
180.
240.
300.
360.
420.
480.
540.
600.
660.
720.
780.
840.
900.

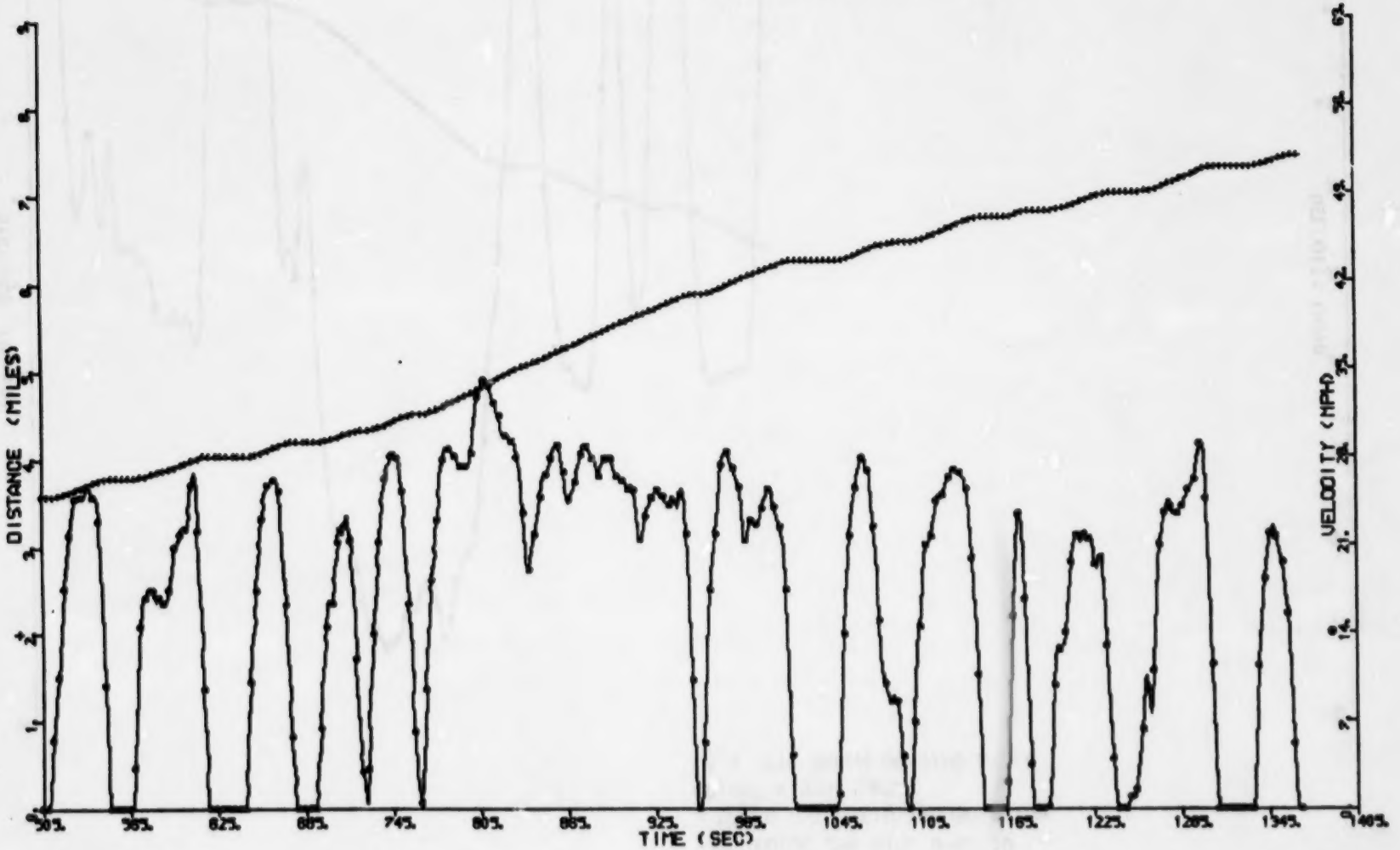

NYC-1 DRIVING CYCLE
Perturbation Factor = 4.0
DISTANCE (MILES)
TIME (SEC)
VELOCITY (MPH)

APPENDIX C

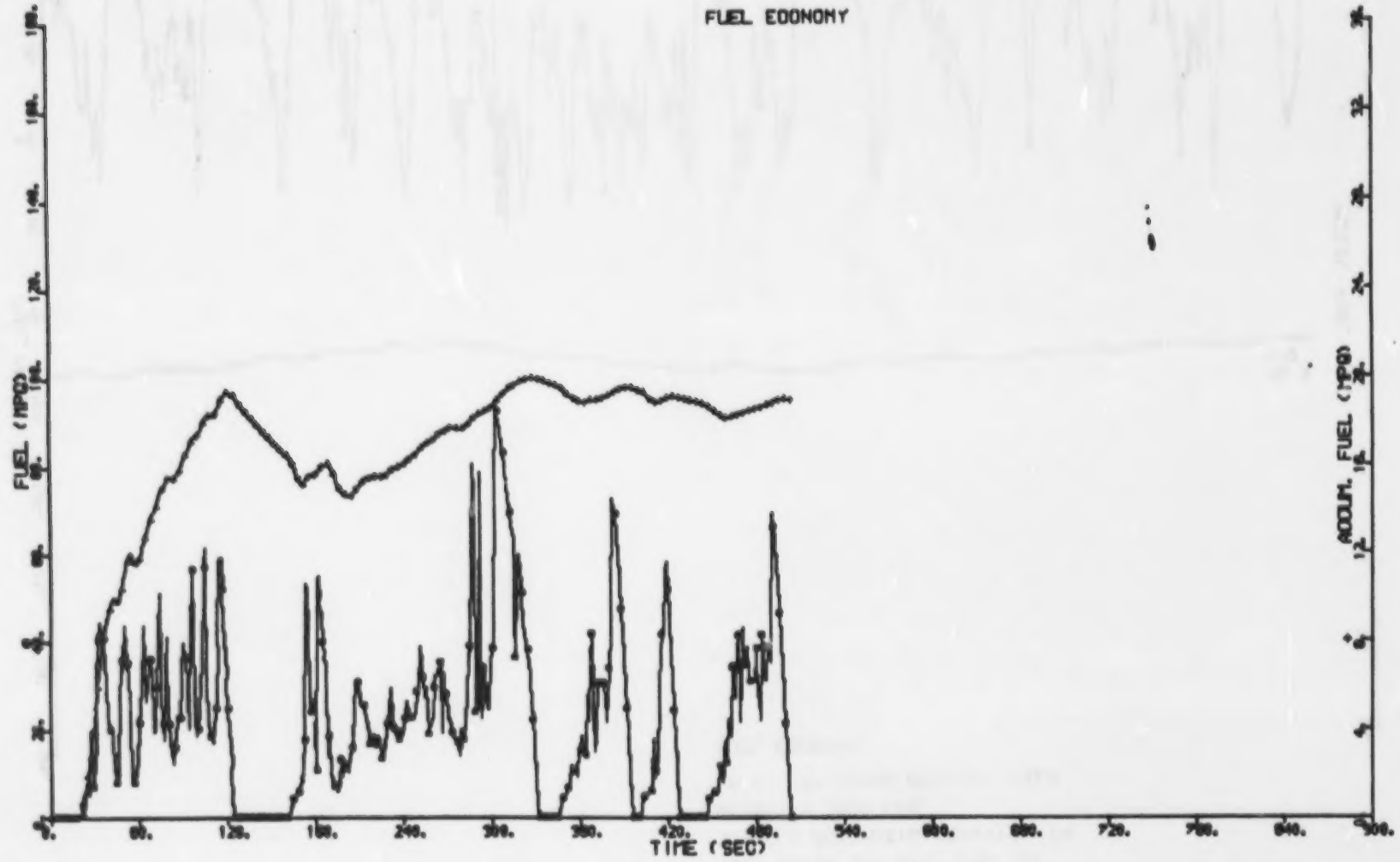
BUICK 231 BASELINE FUEL AND EMISSION PLOTS


1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LA 4 FTP URBAN DRIVING CYCLE
DISTANCE (MILES)
VELOCITY (MPH)
TIME (SEC)
0.
60.
120.
180.
240.
300.
360.
420.
480.
540.
600.
660.
720.
780.
840.
900.

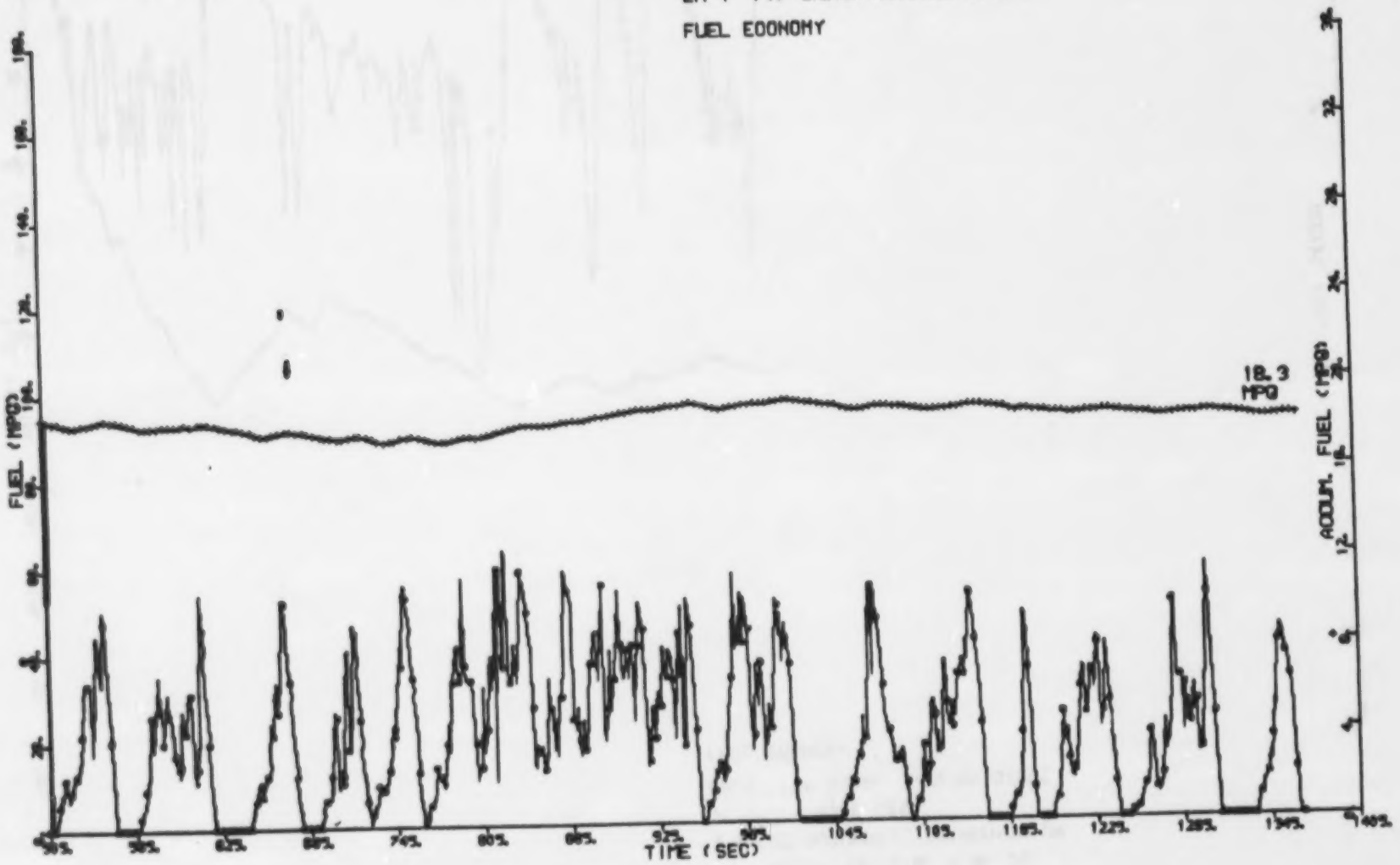
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LA 4 FTP URBAN DRIVING CYCLE



1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LA 4 FTP URBAN DRIVING CYCLE
FUEL ECONOMY

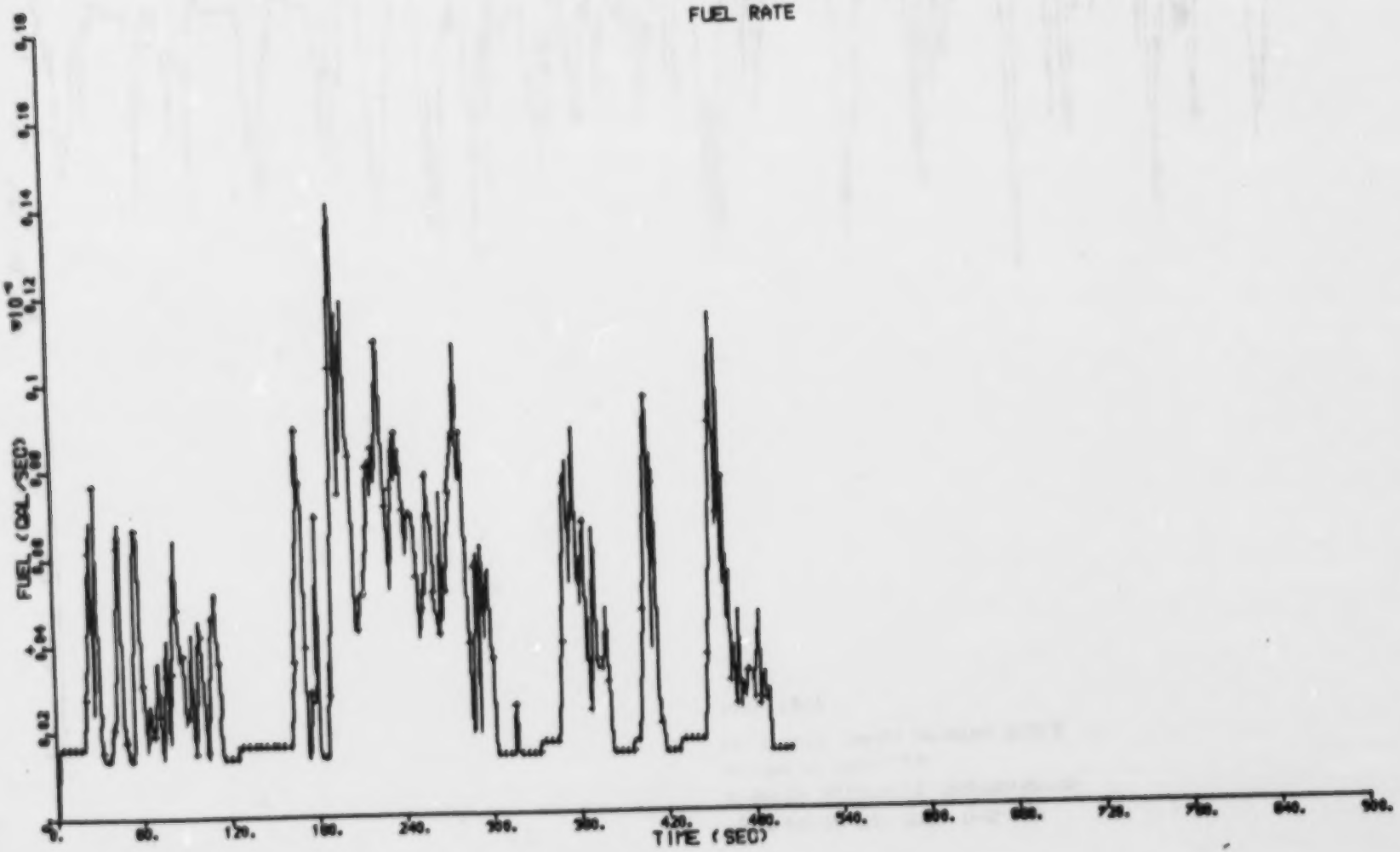


1977 BUICK 231 OID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LA 4 FTP URBAN DRIVING CYCLE
FUEL ECONOMY

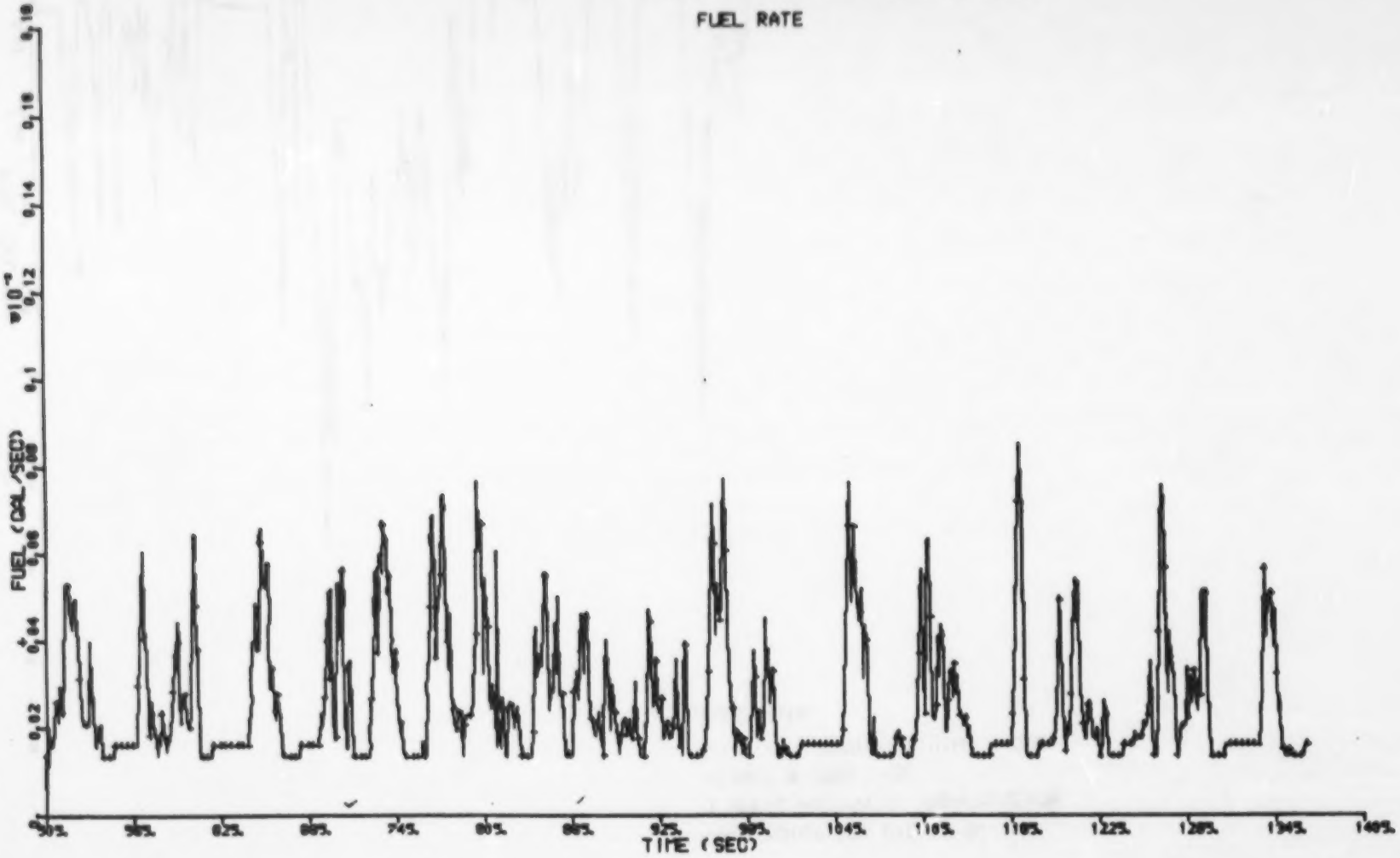


1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LA 4 FTP URBAN DRIVING CYCLE

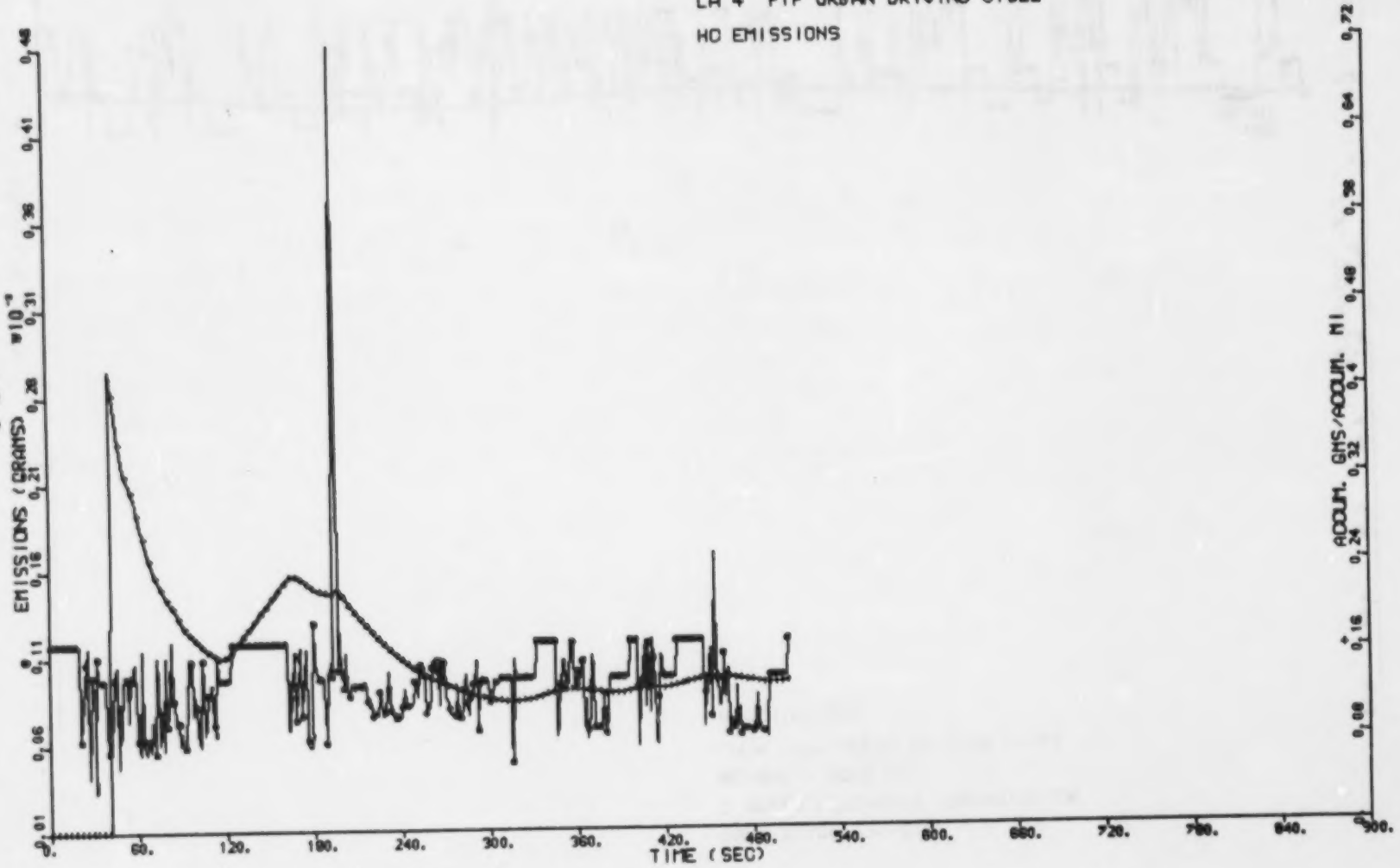
FUEL RATE



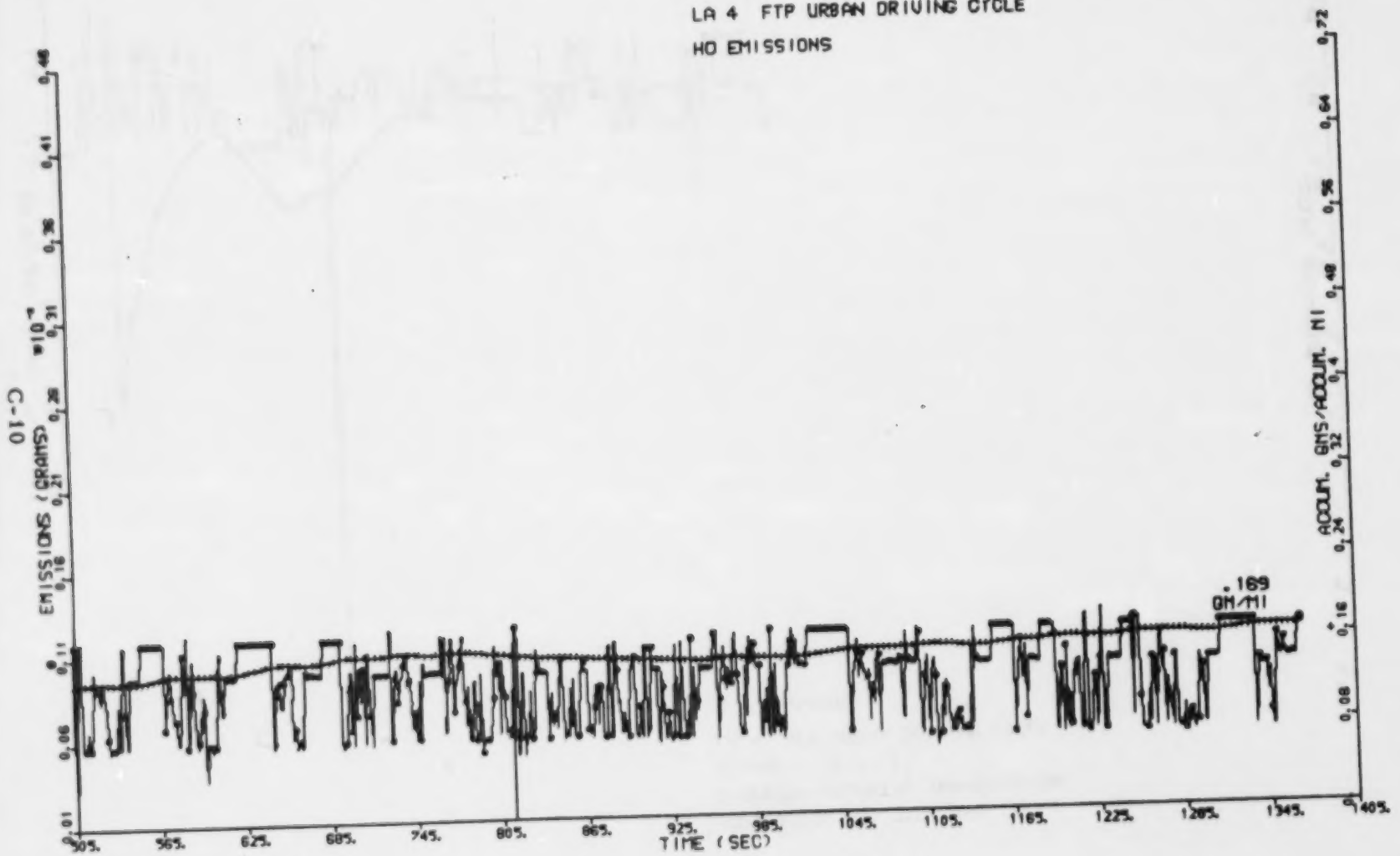
1977 BUICK 231 OID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LA 4 FTP URBAN DRIVING CYCLE
FUEL RATE



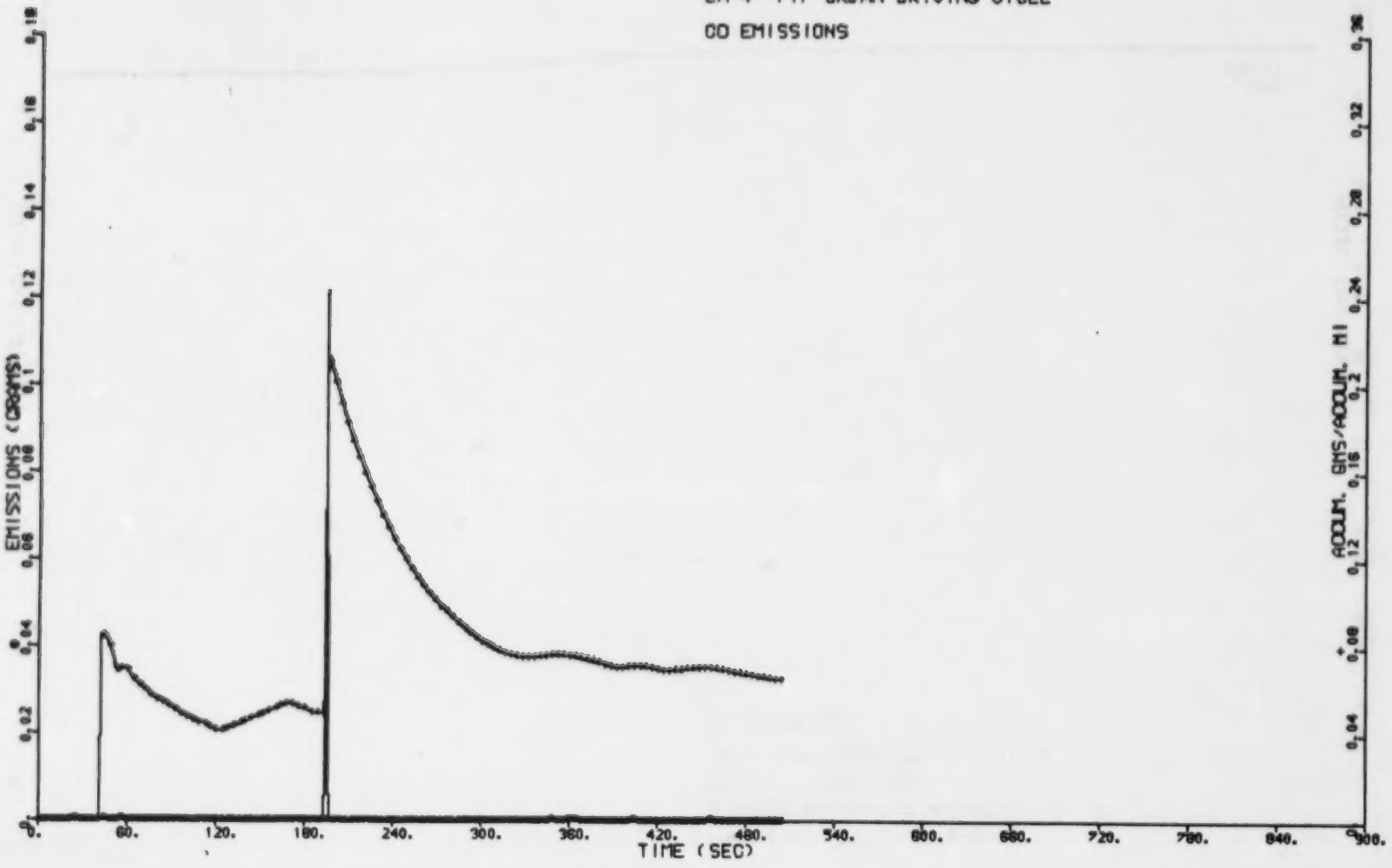
1977 BUICK Z31 OID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LA 4 FTP URBAN DRIVING CYCLE
HC EMISSIONS



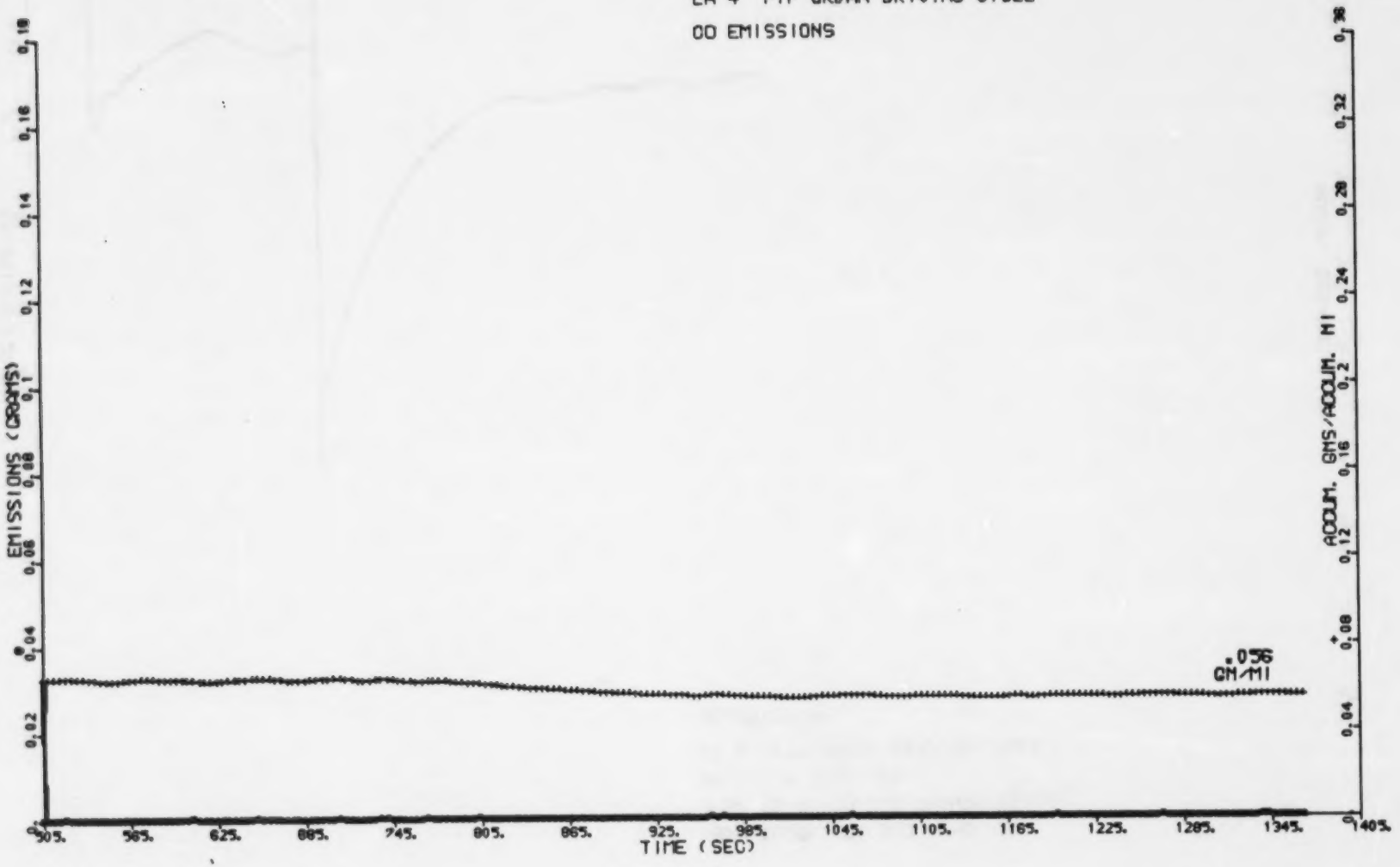
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LA 4 FTP URBAN DRIVING CYCLE
NO EMISSIONS



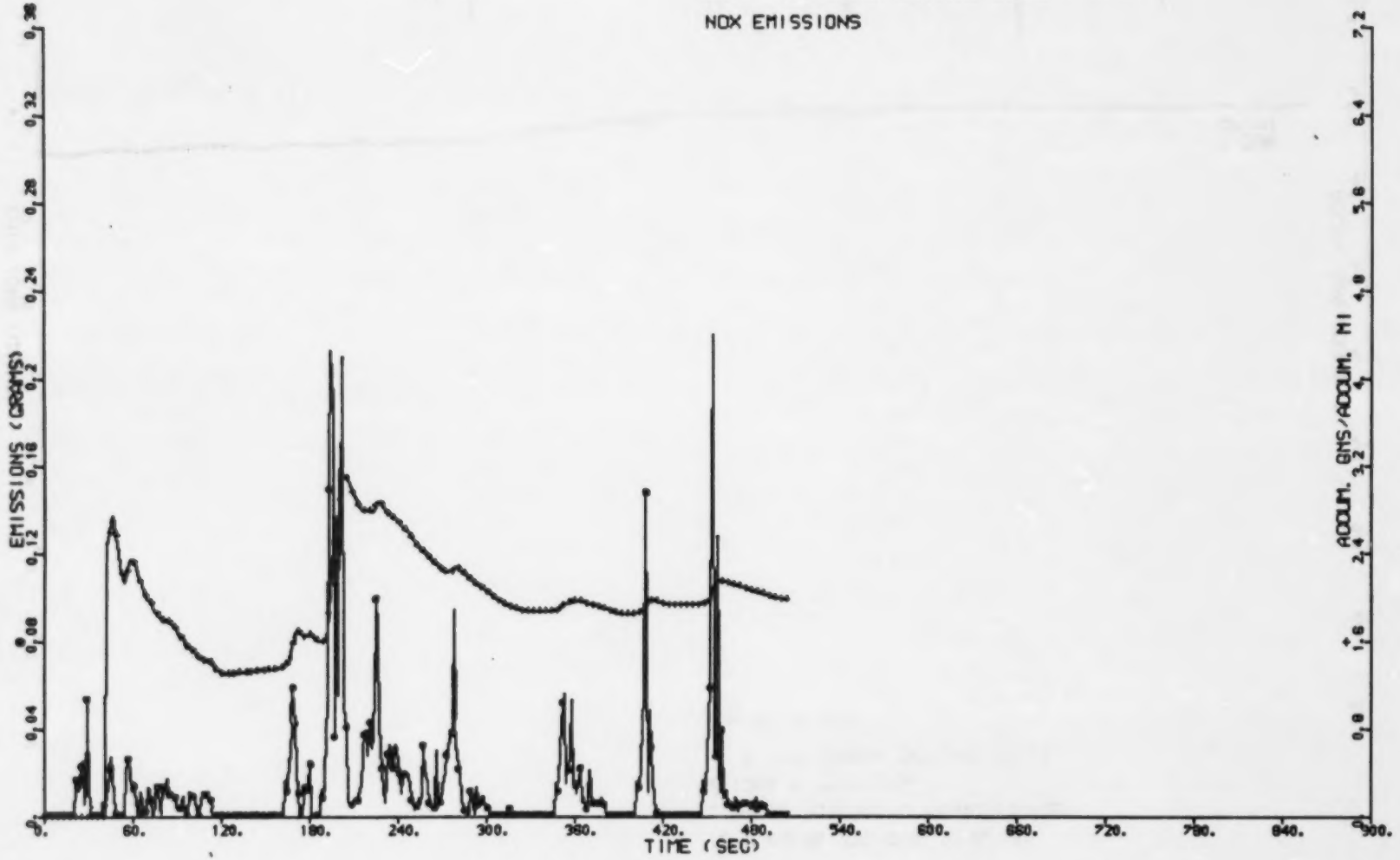
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LA 4 FTP URBAN DRIVING CYCLE
CO EMISSIONS



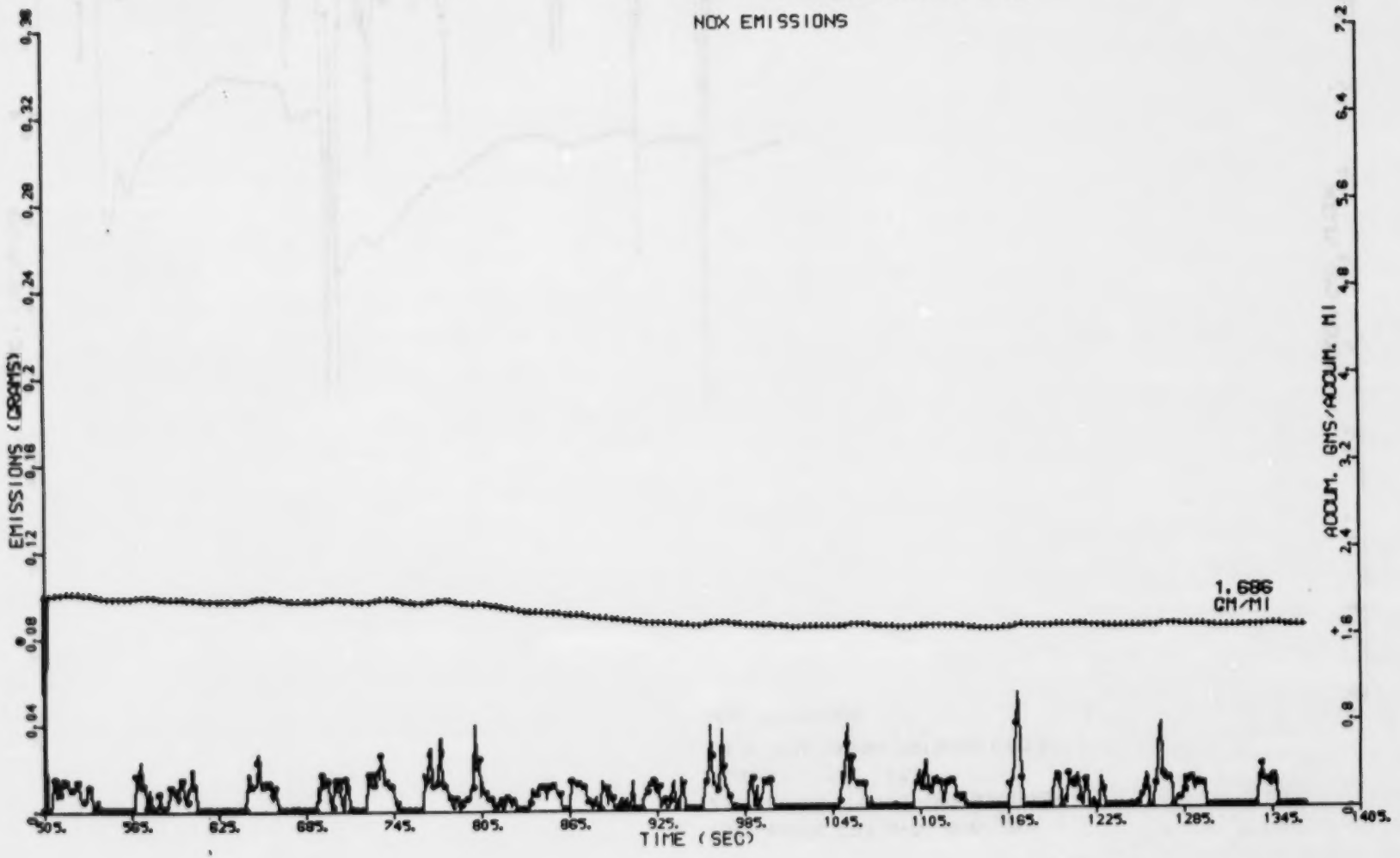
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LA 4 FTP URBAN DRIVING CYCLE
CO EMISSIONS

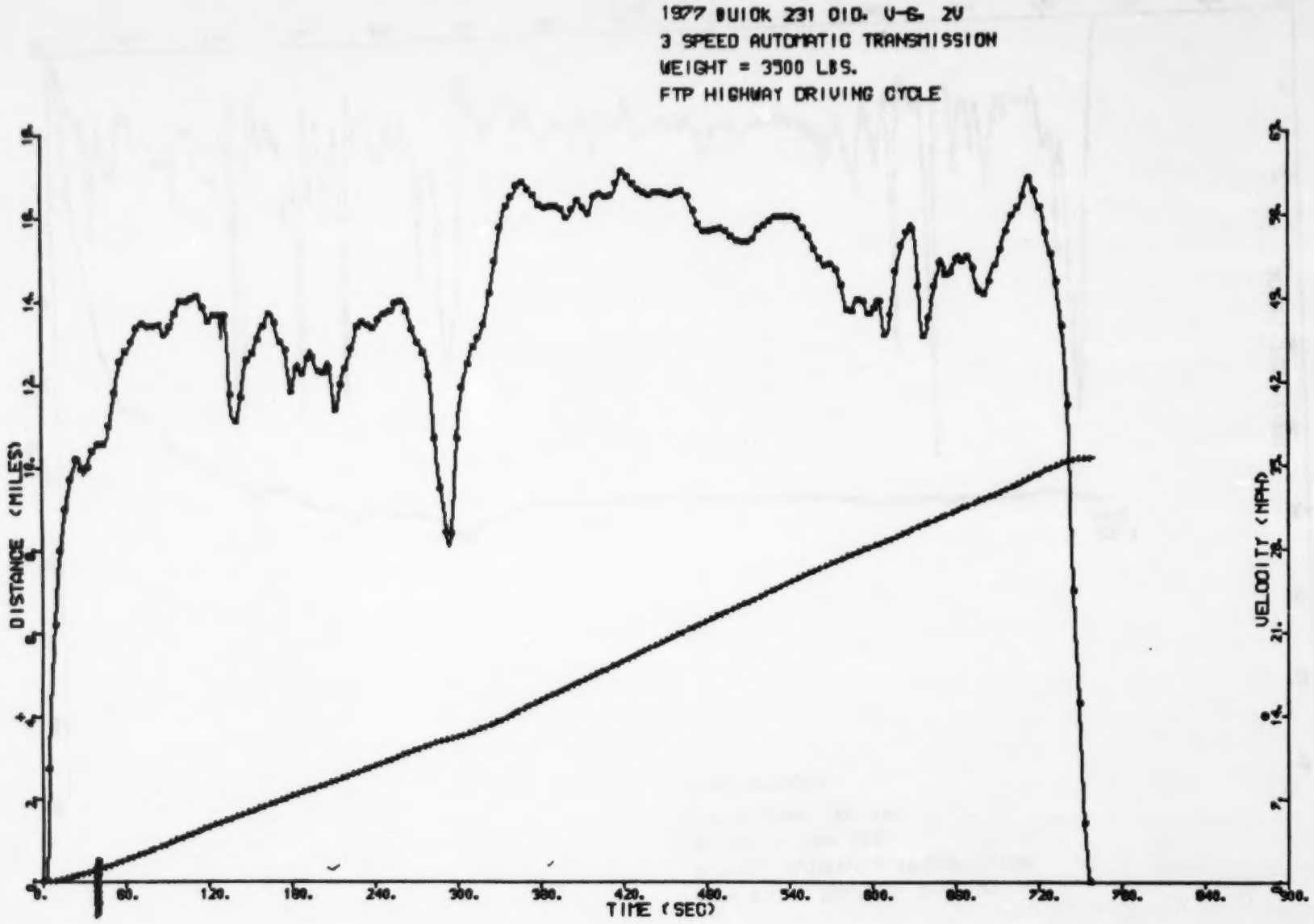


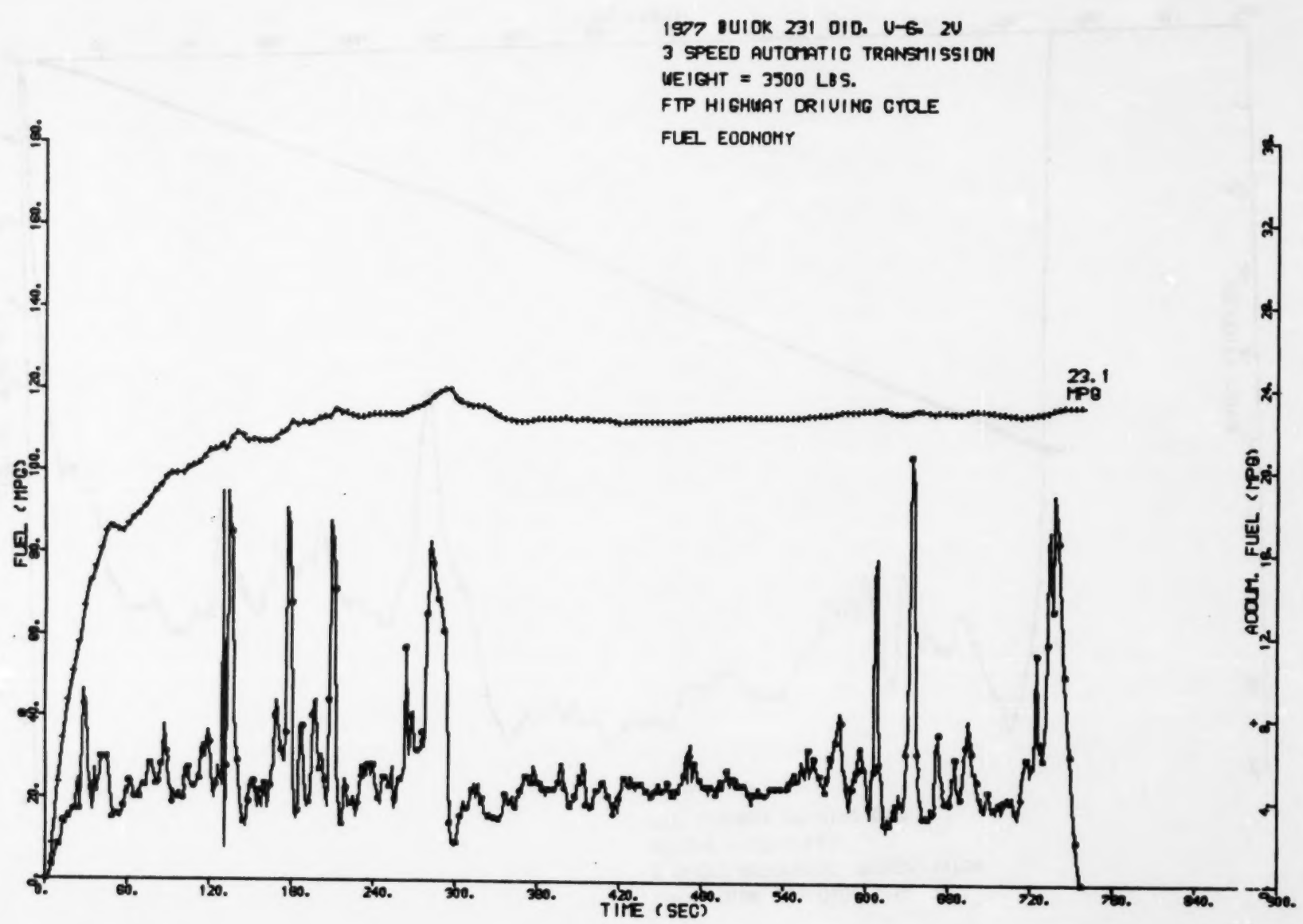
1977 BUICK 231 OID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LA 4 FTP URBAN DRIVING CYCLE
NOX EMISSIONS



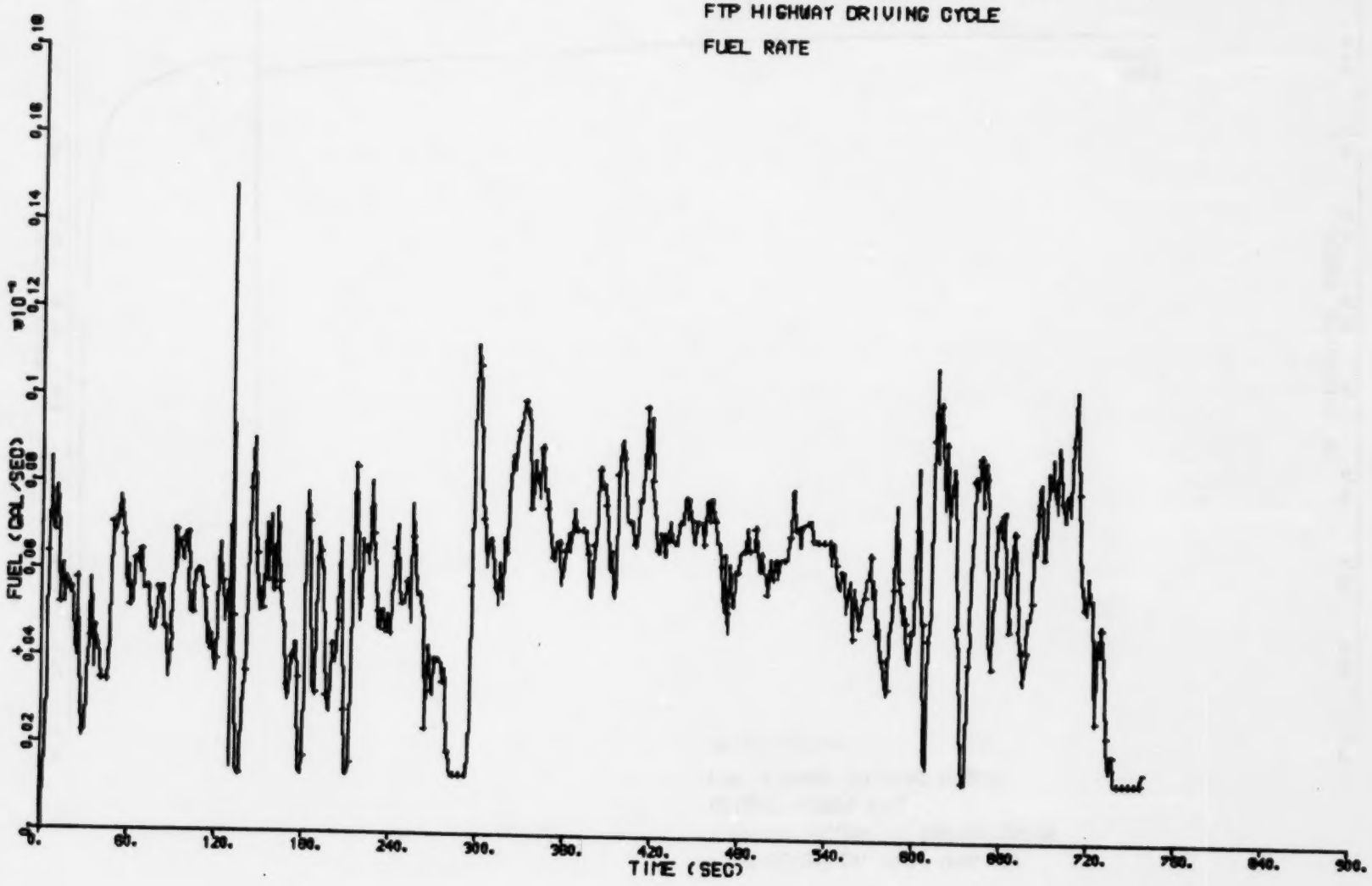
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LA 4 FTP URBAN DRIVING CYCLE
NOX EMISSIONS



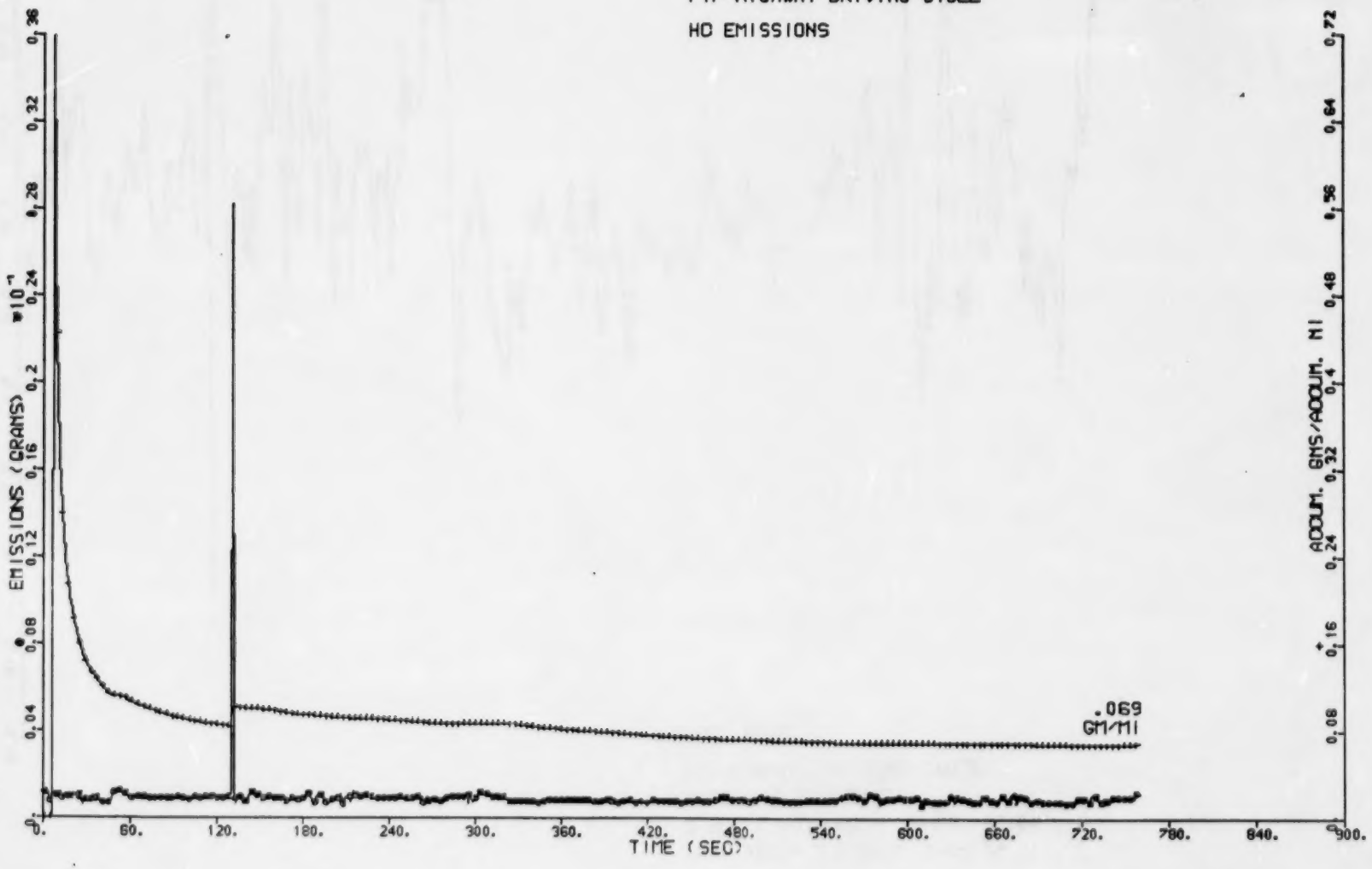

1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
FTP HIGHWAY DRIVING CYCLE
DISTANCE (MILES)
VELOCITY (MPH)
TIME (SEC)
0.
60.
120.
180.
240.
300.
360.
420.
480.
540.
600.
660.
720.
780.
840.
900.


1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
FTP HIGHWAY DRIVING CYCLE
FUEL ECONOMY
23.1 MPG
FUEL (MPG)
ACCUM. FUEL (MPG)
TIME (SEC)
0.
60.
120.
180.
240.
300.
360.
420.
480.
540.
600.
660.
720.
780.
840.
900.

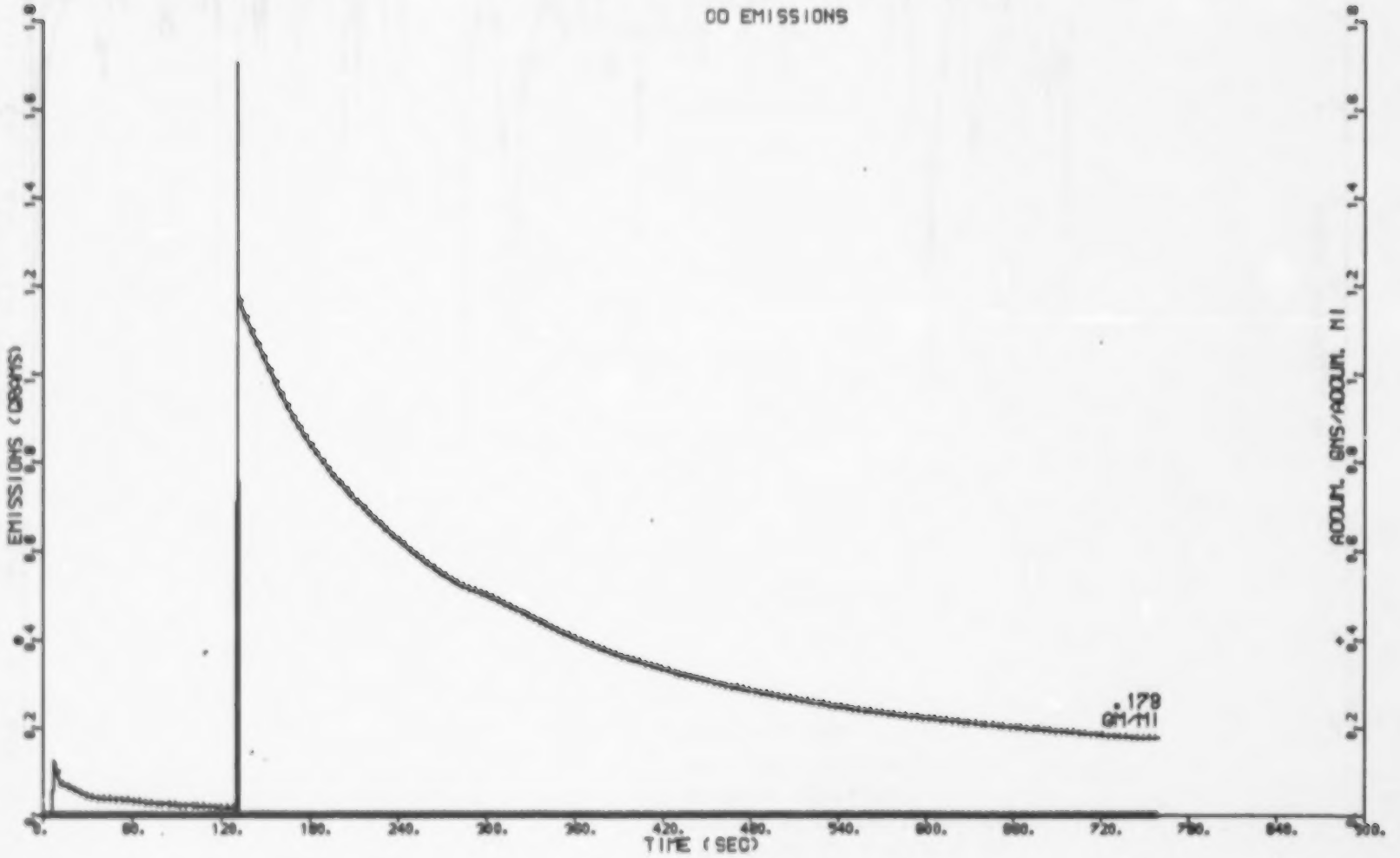
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
FTP HIGHWAY DRIVING CYCLE
FUEL RATE



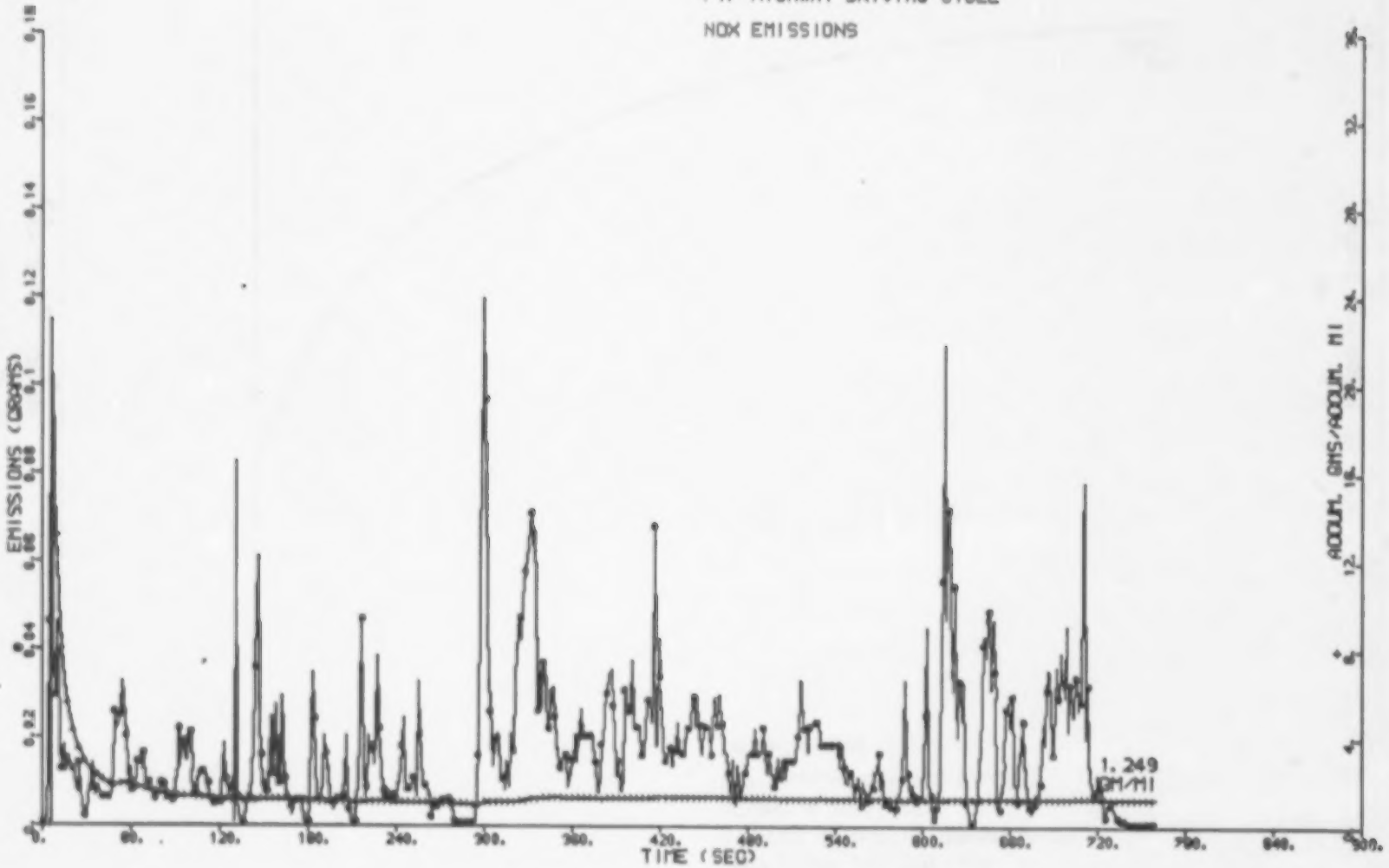
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
FTP HIGHWAY DRIVING CYCLE
HC EMISSIONS



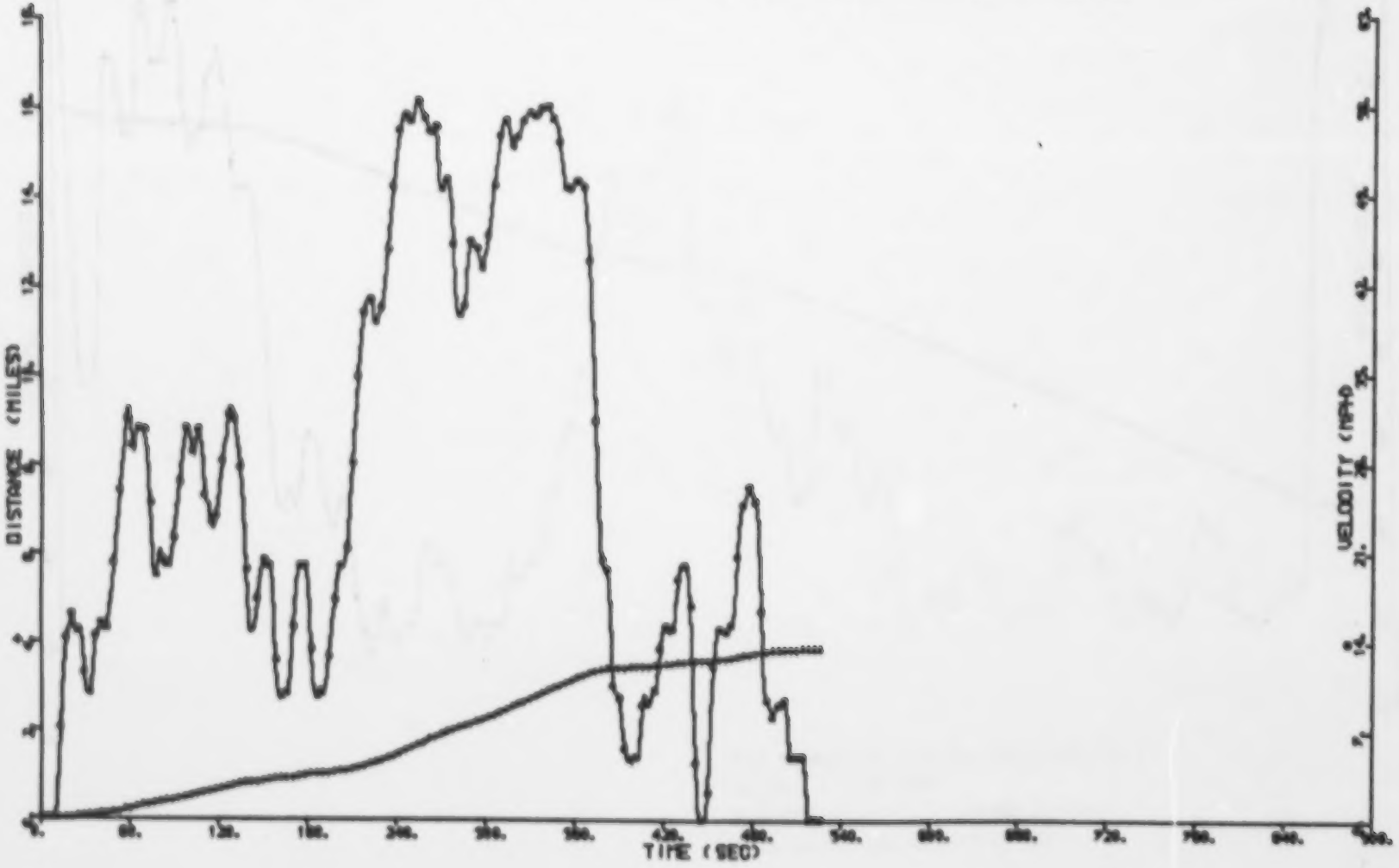
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
FTP HIGHWAY DRIVING CYCLE
CO EMISSIONS



1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
FTP HIGHWAY DRIVING CYCLE
NOX EMISSIONS

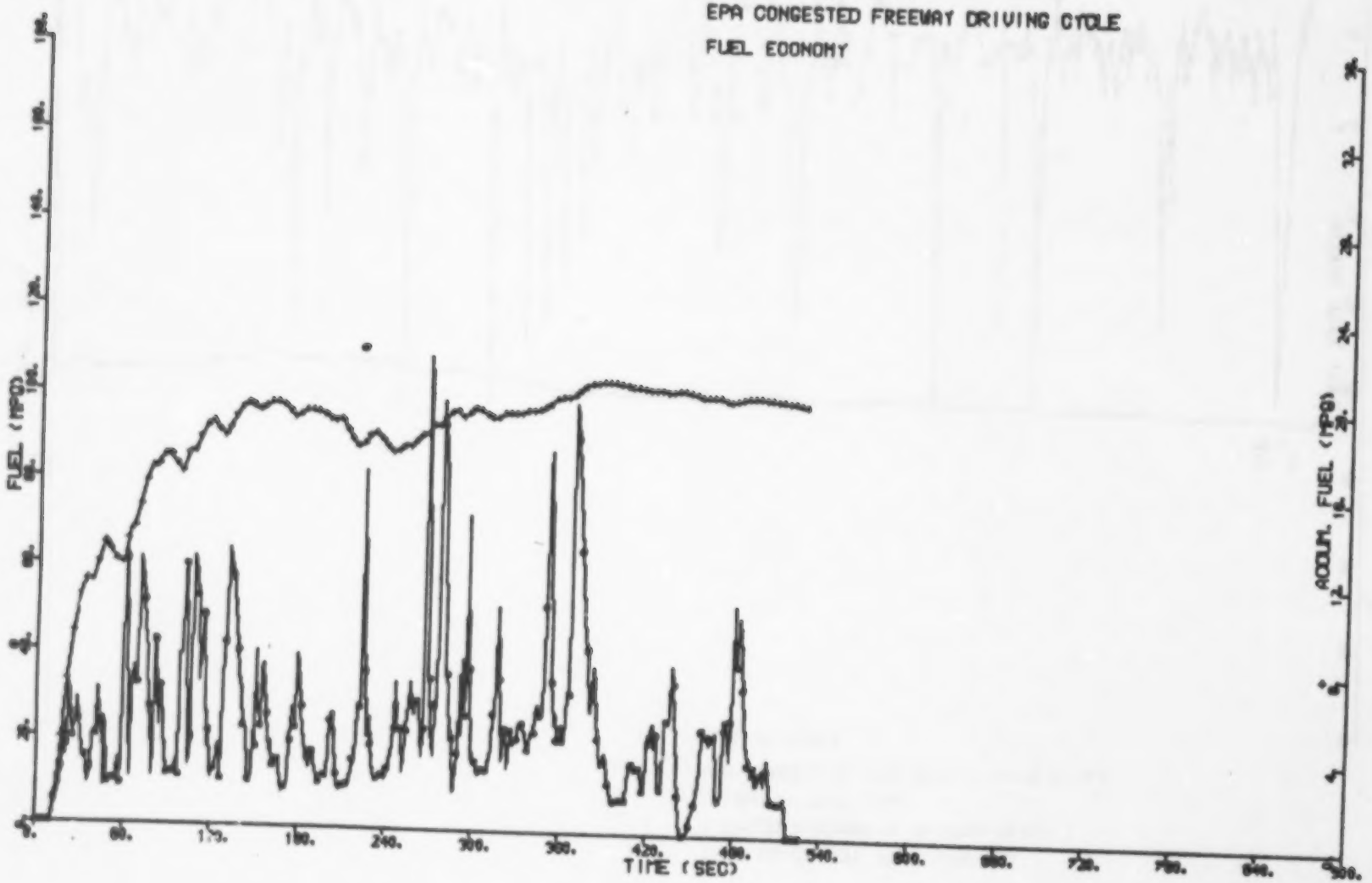


1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
EPA CONGESTED FREEWAY DRIVING CYCLE

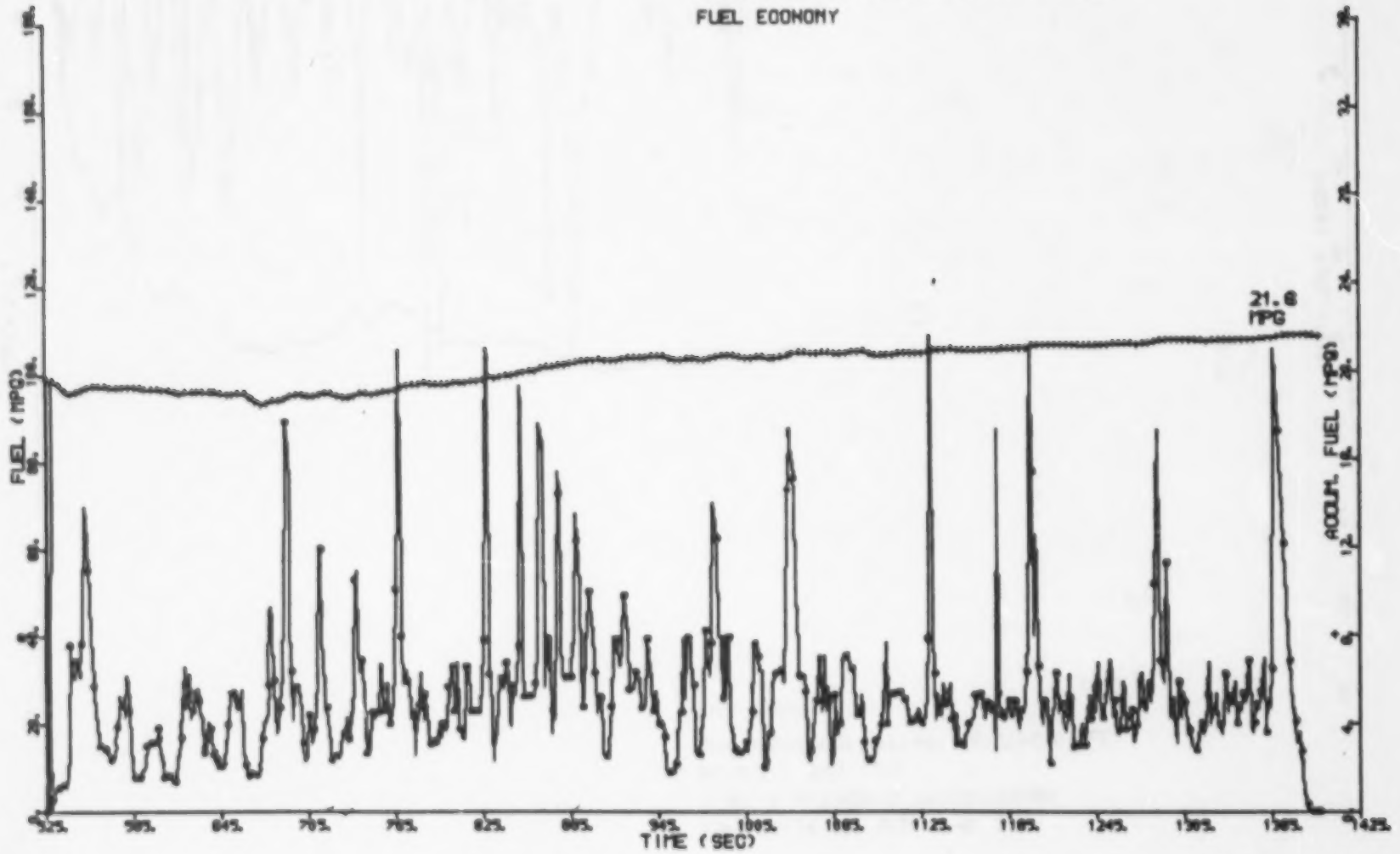


1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
EPA CONGESTED FREEWAY DRIVING CYCLE
DISTANCE (MILES)
VELOCITY (MPH)
TIME (SEC)

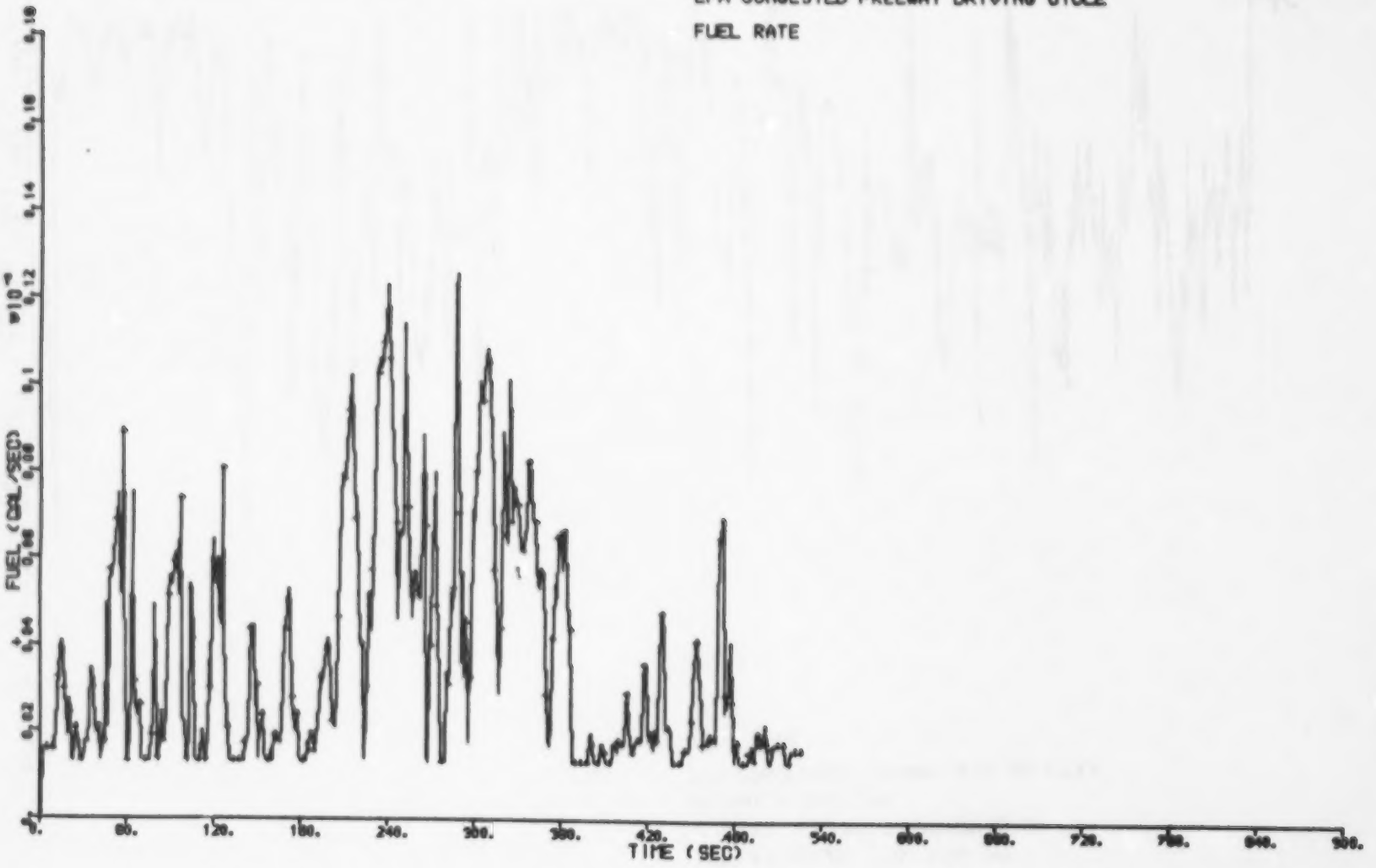
1977 BUICK 231 OID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
EPA CONGESTED FREEWAY DRIVING CYCLE
FUEL ECONOMY



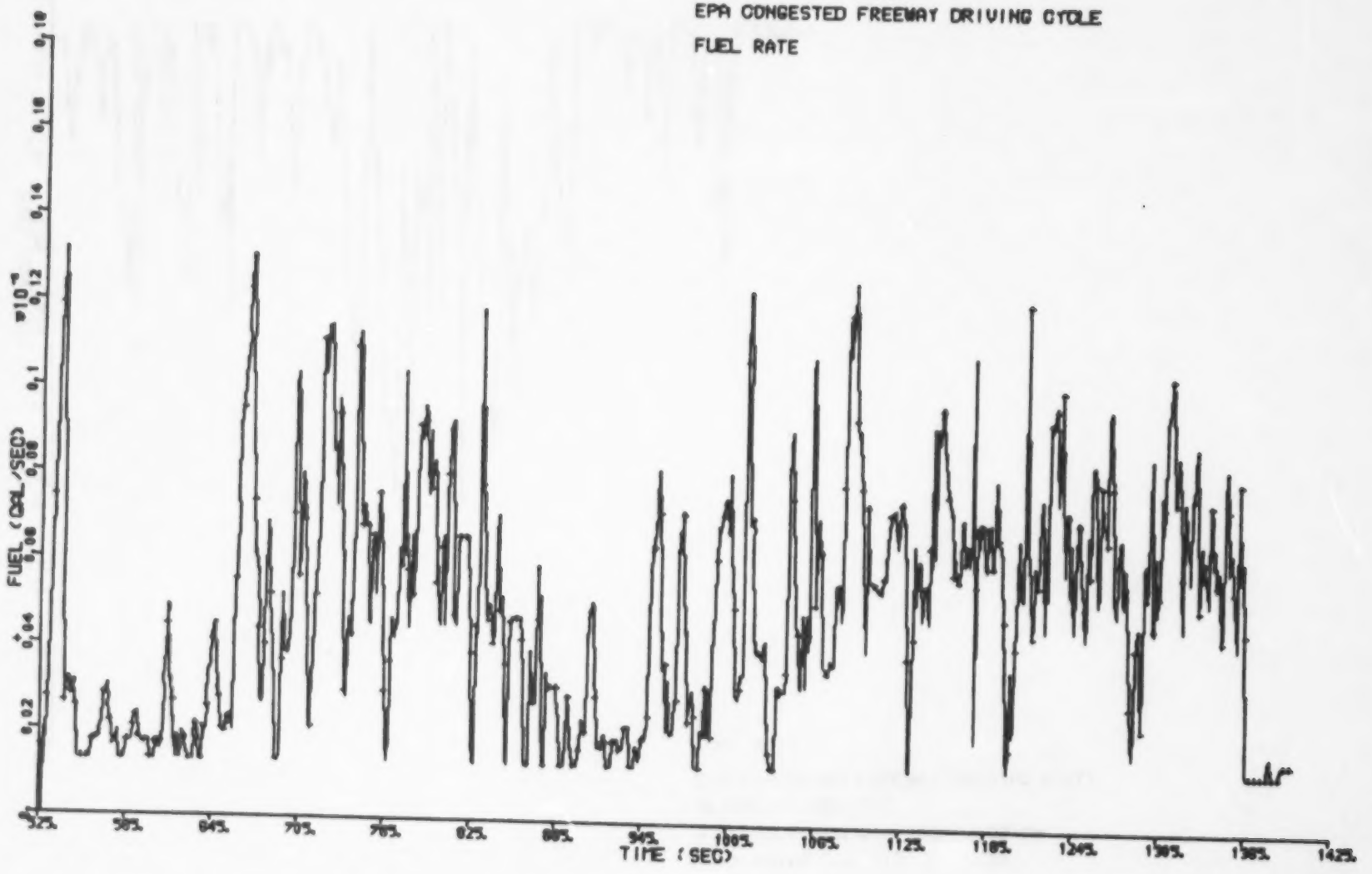
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
EPA CONGESTED FREEWAY DRIVING CYCLE
FUEL ECONOMY



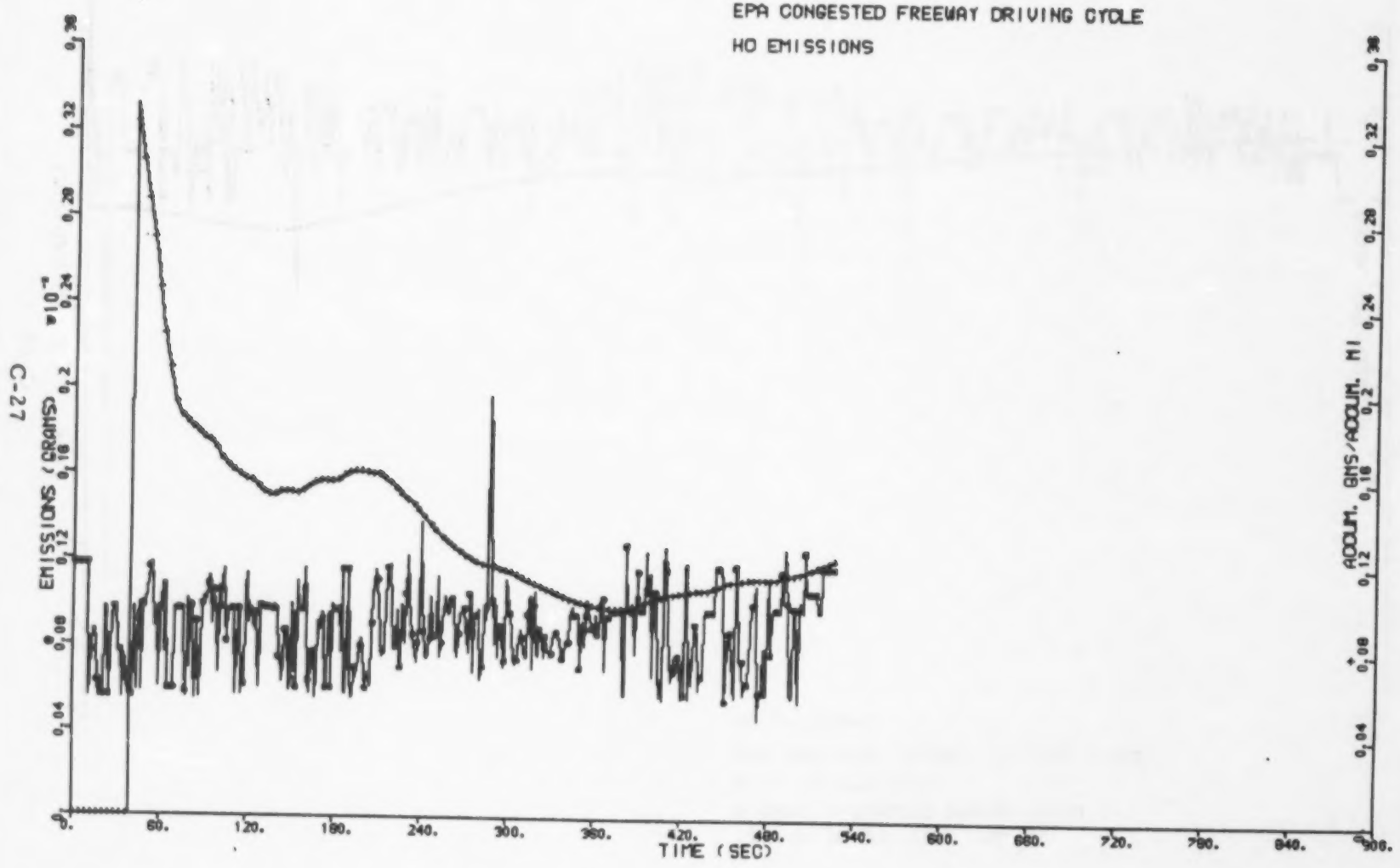
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
EPA CONGESTED FREEWAY DRIVING CYCLE
FUEL RATE



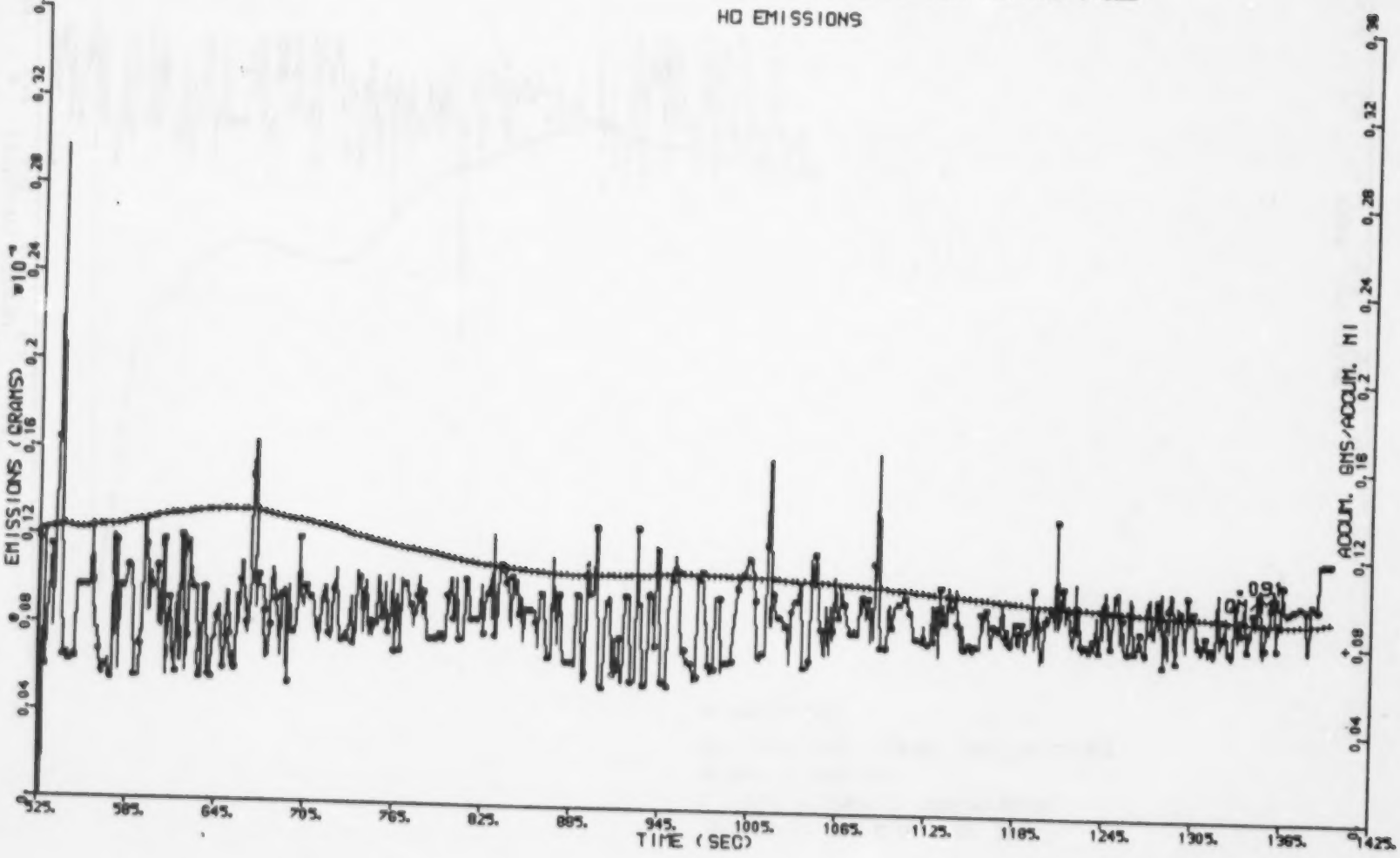
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
EPA CONGESTED FREEWAY DRIVING CYCLE
FUEL RATE



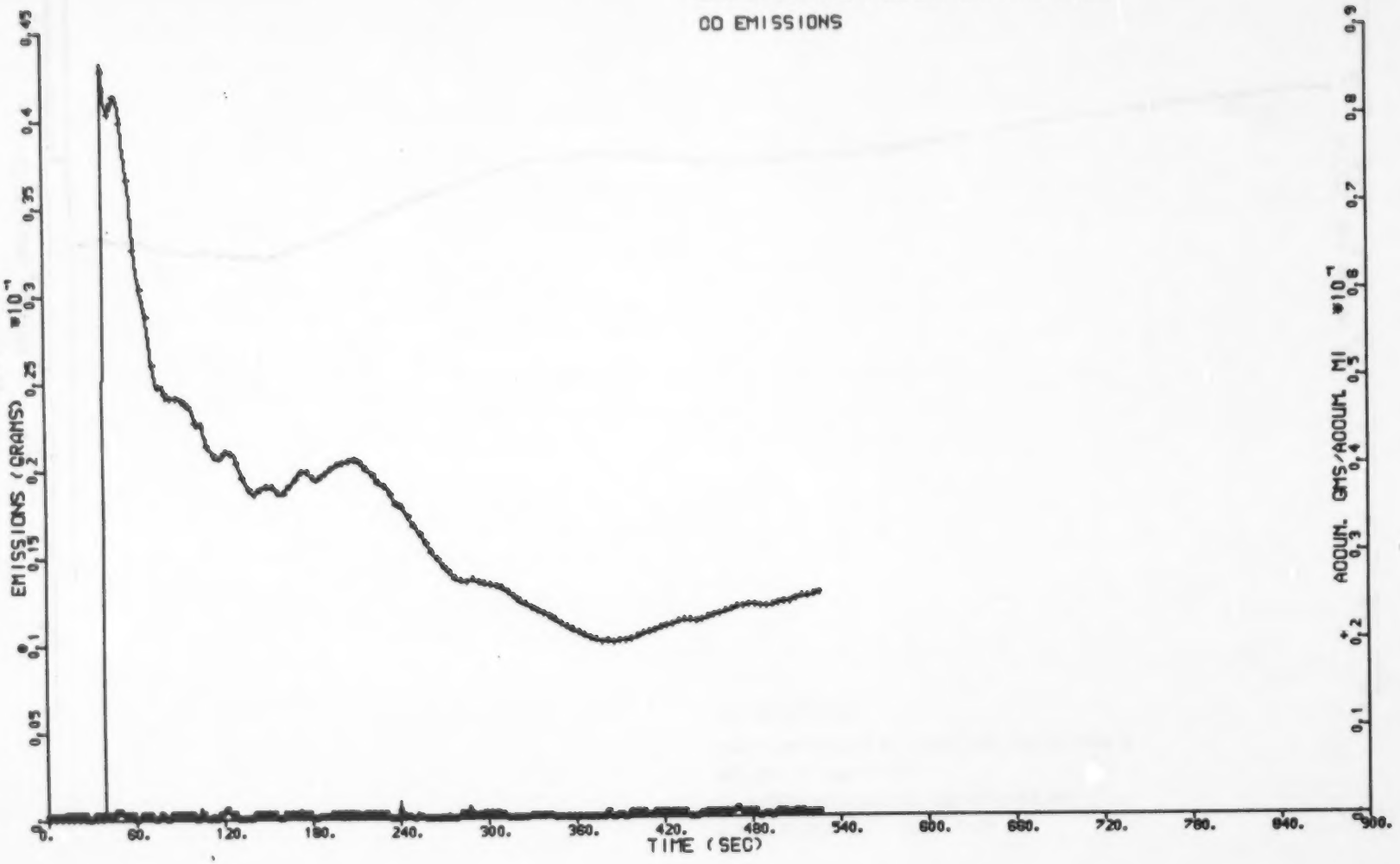
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
EPA CONGESTED FREEWAY DRIVING CYCLE
HC EMISSIONS



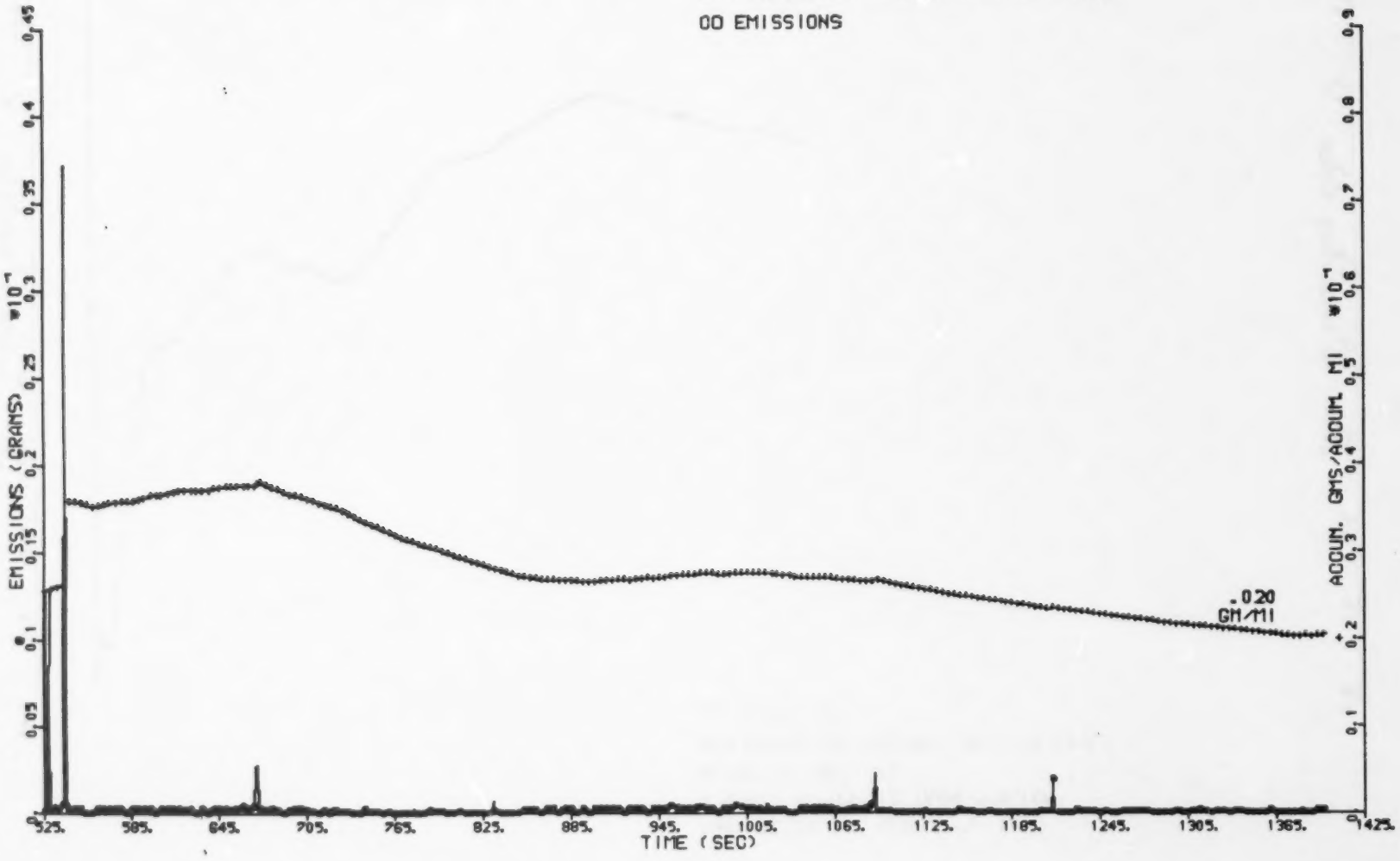
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
EPA CONGESTED FREEWAY DRIVING CYCLE
HC EMISSIONS



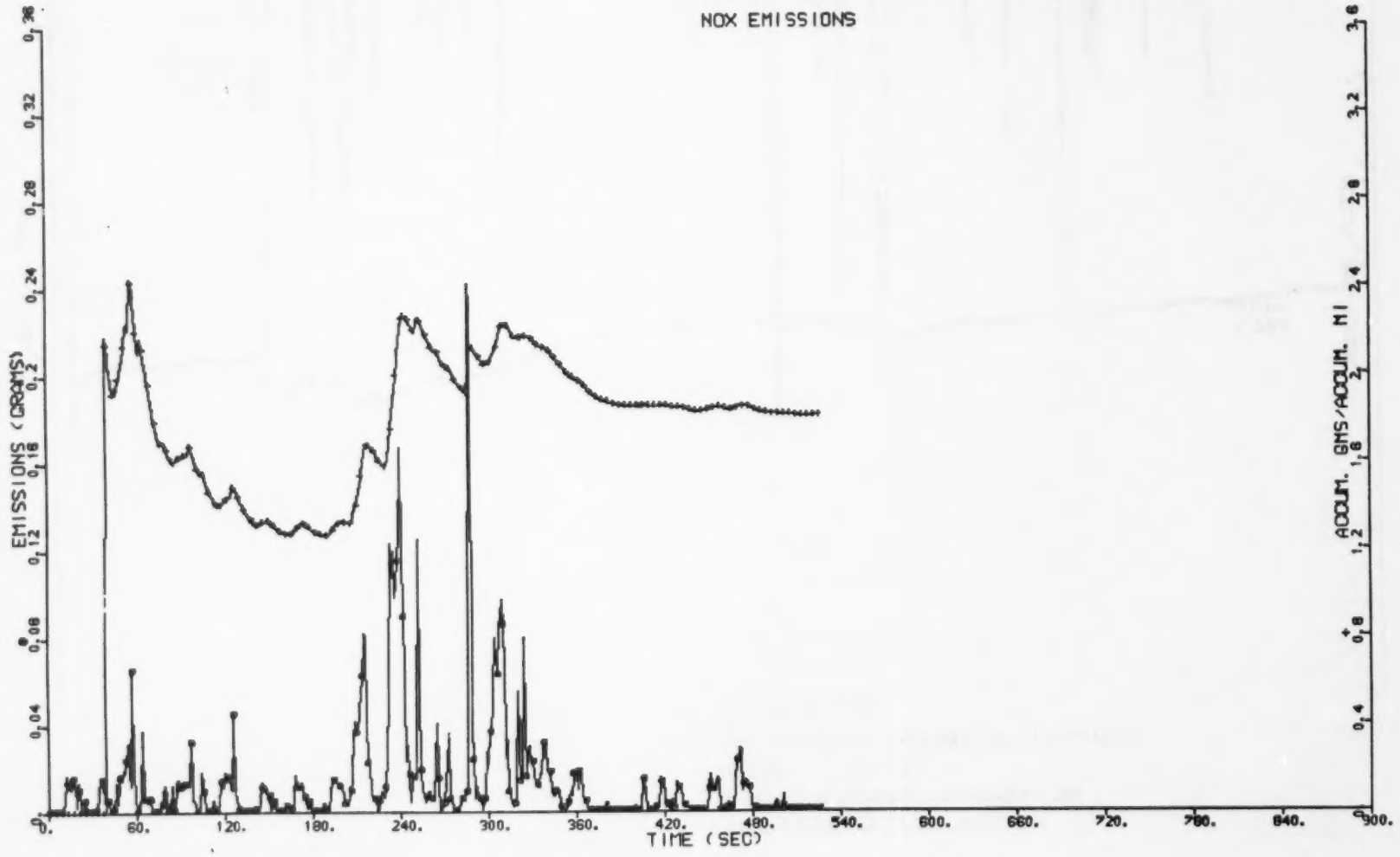
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
EPA CONGESTED FREEWAY DRIVING CYCLE
CO EMISSIONS



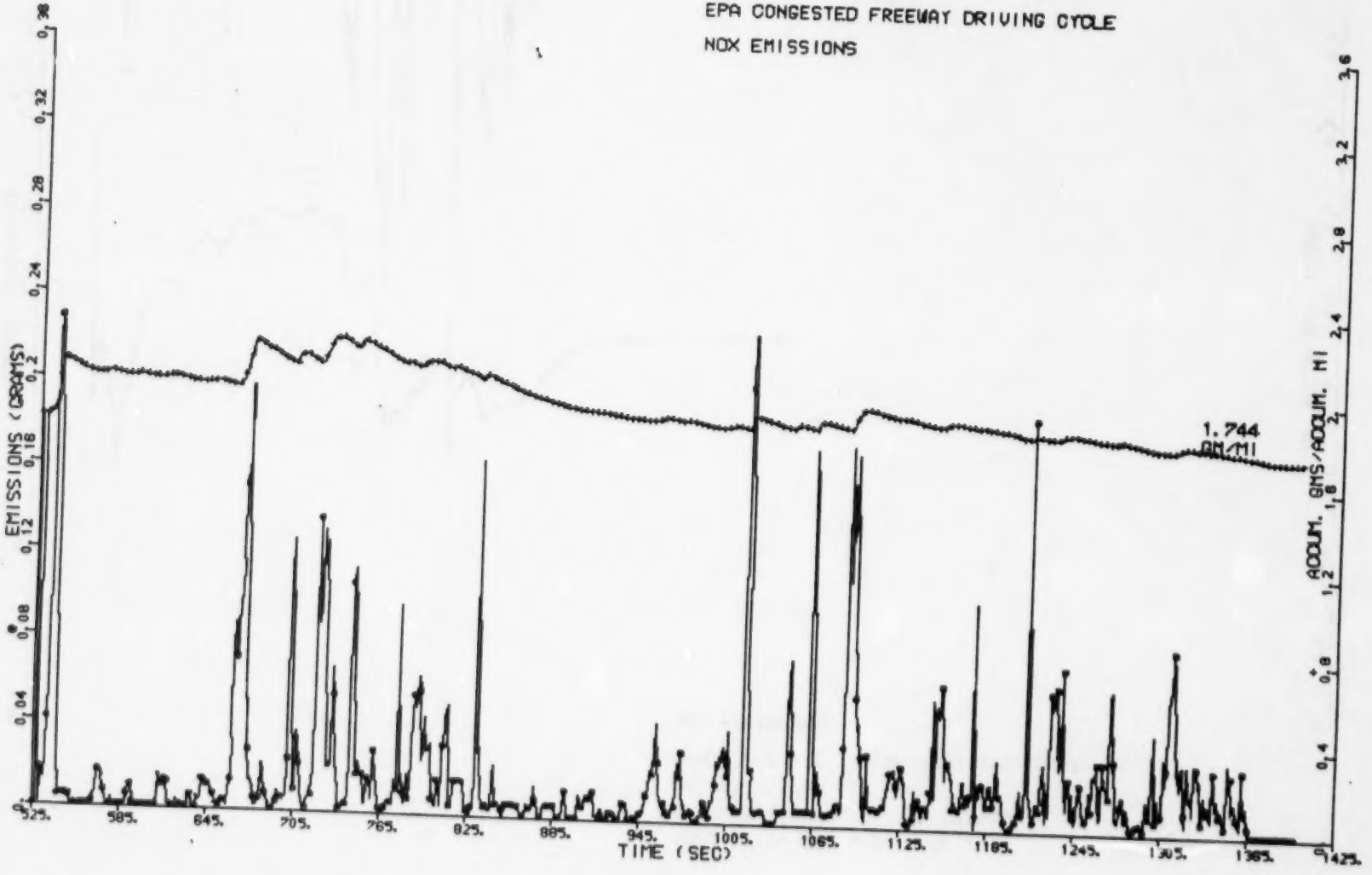
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
EPA CONGESTED FREEWAY DRIVING CYCLE
CO EMISSIONS



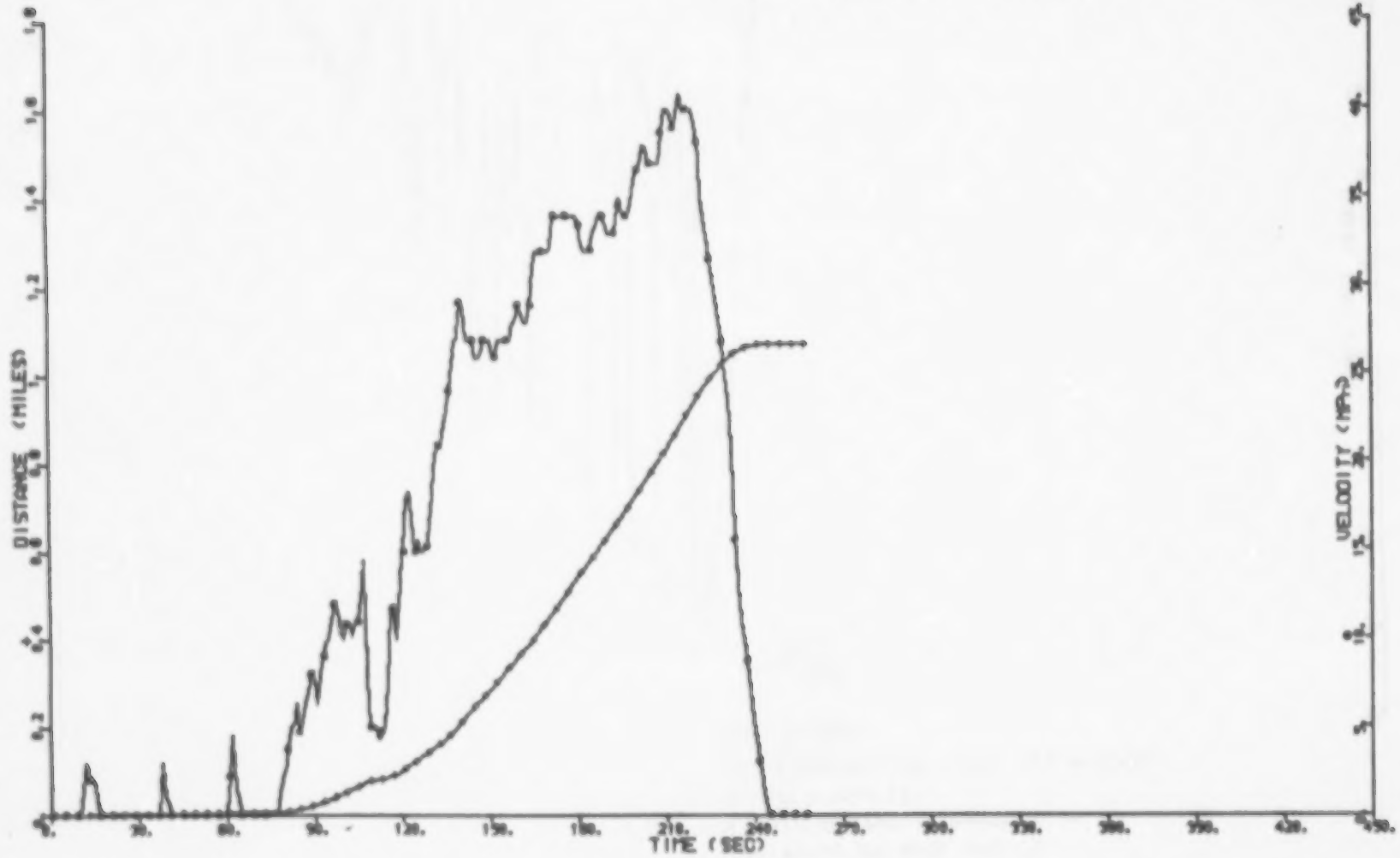
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
EPA CONGESTED FREEWAY DRIVING CYCLE
NOX EMISSIONS

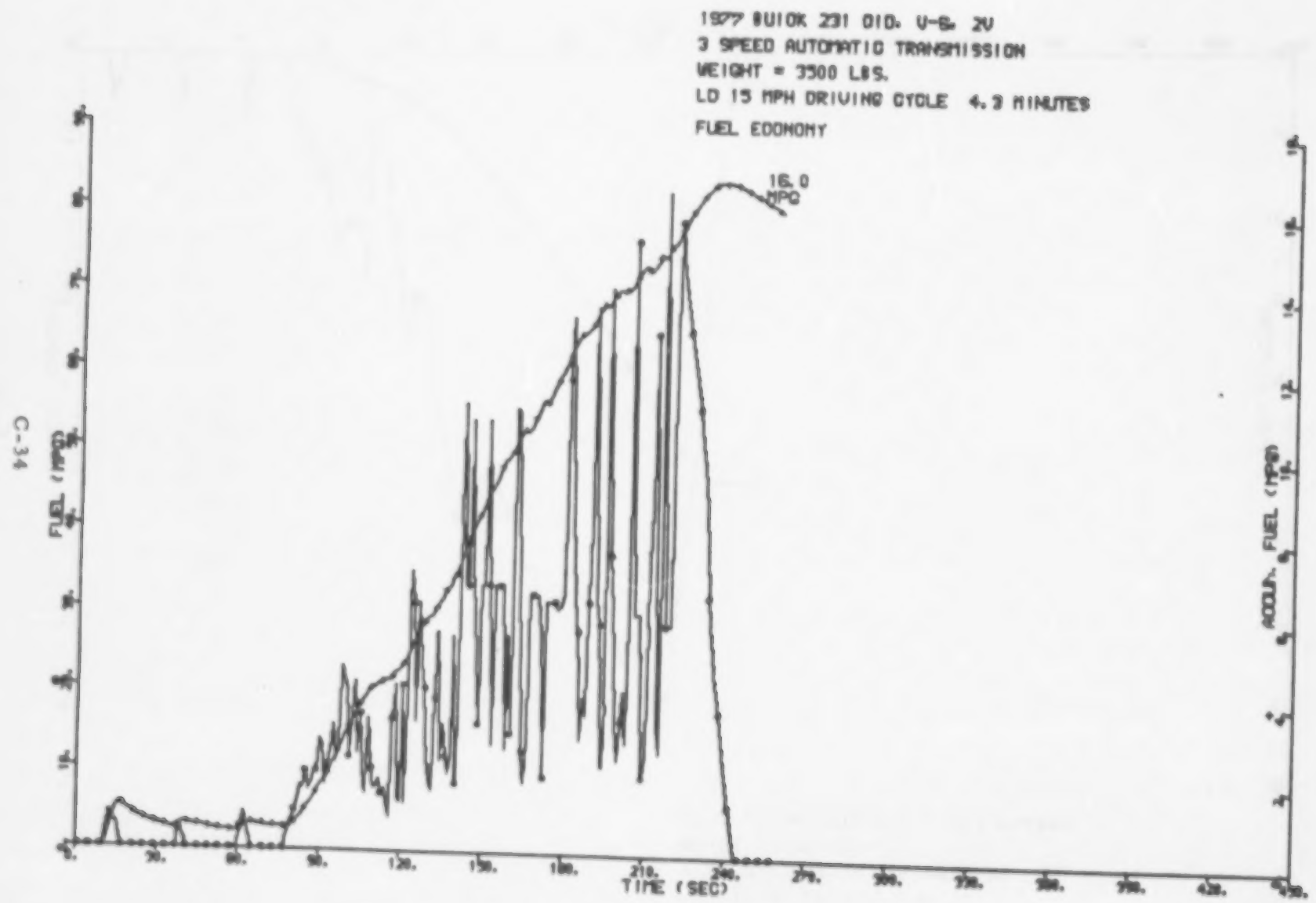


1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
EPA CONGESTED FREEWAY DRIVING CYCLE
NOX EMISSIONS

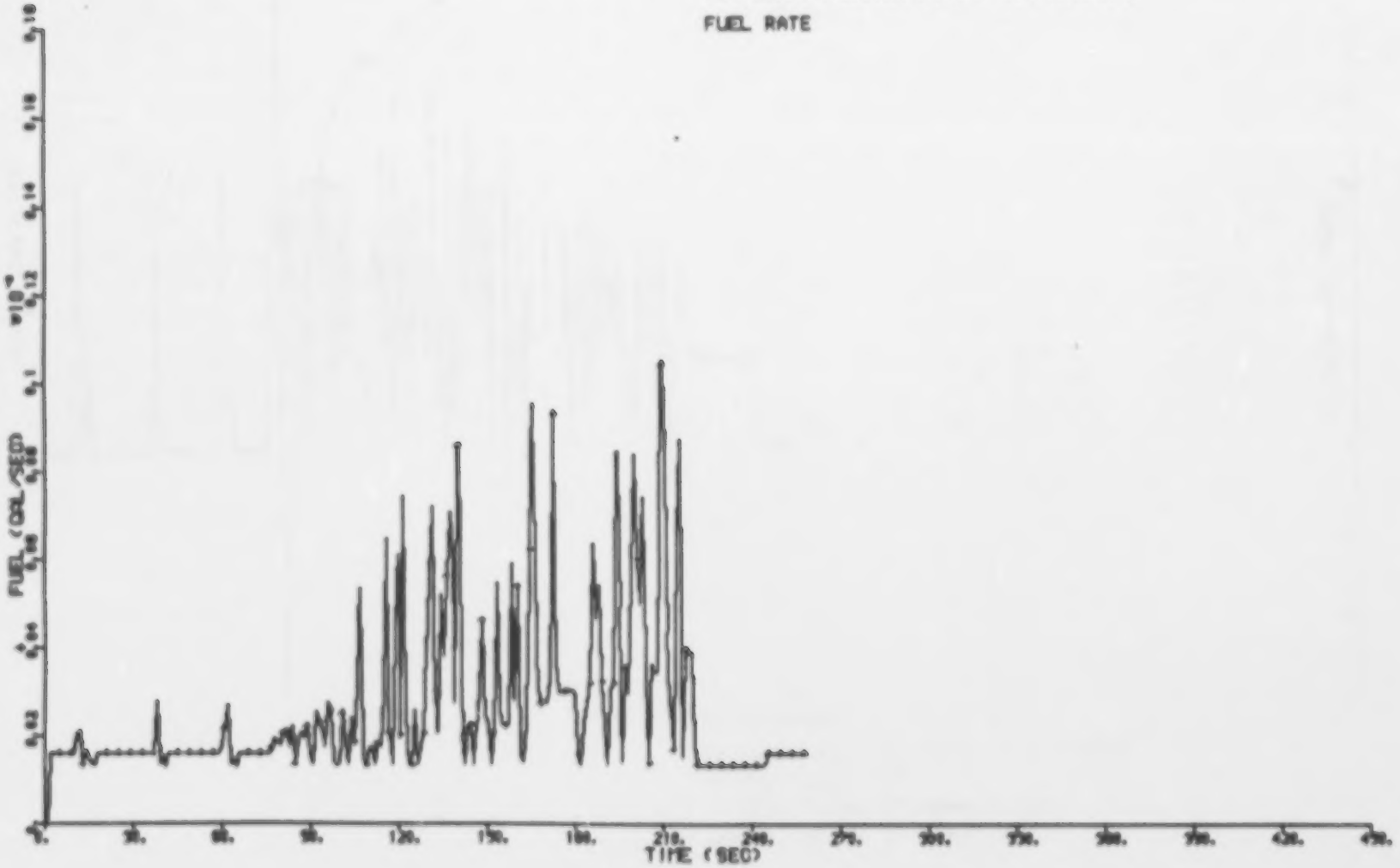


1977 BUICK 231 CID. V-6 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LD 15 MPH DRIVING CYCLE 4.3 MINUTES

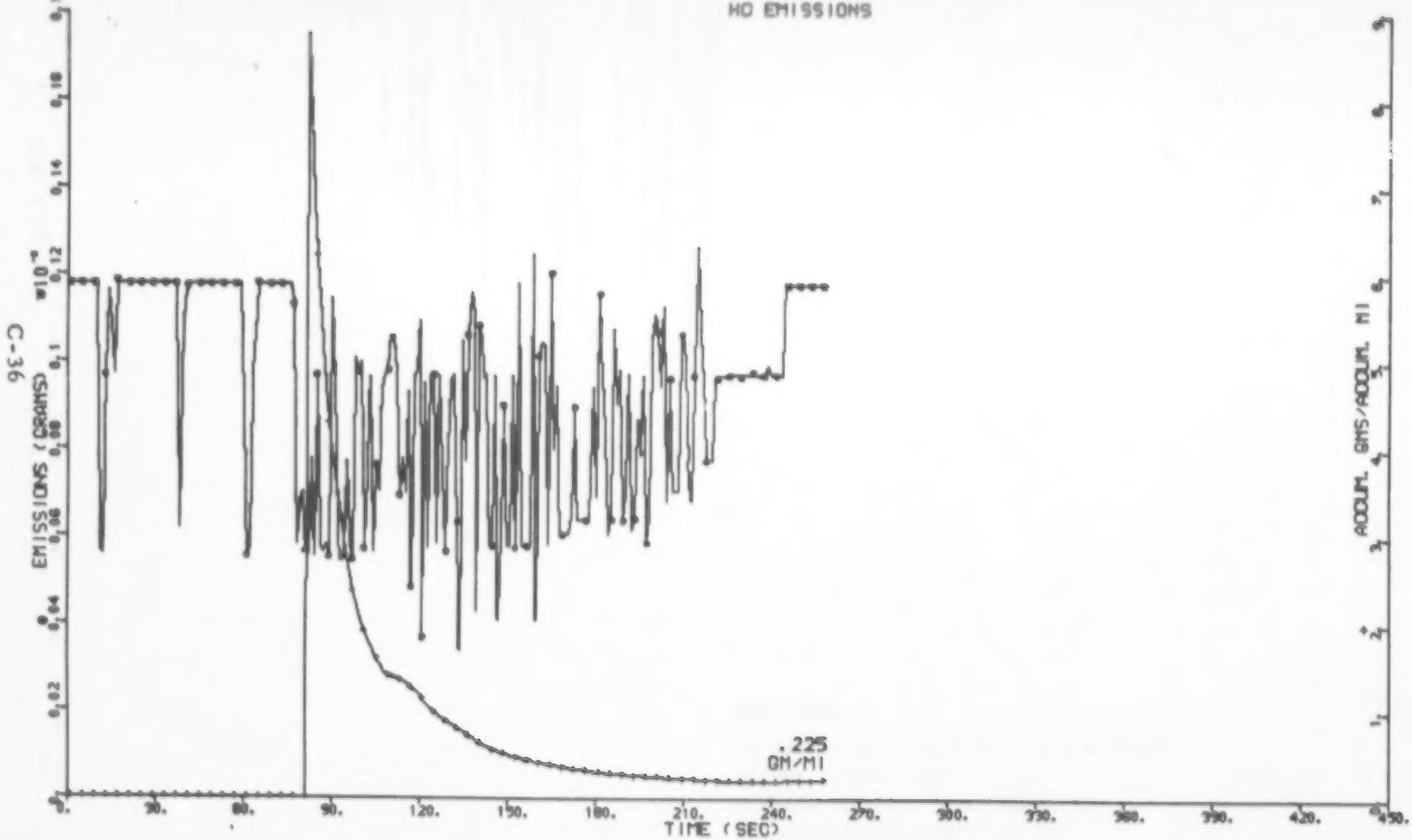



1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LD 15 MPH DRIVING CYCLE 4.3 MINUTES
FUEL ECONOMY
16.0 MPG
FUEL (MPG)
ACCUM. FUEL (MPG)
TIME (SEC)

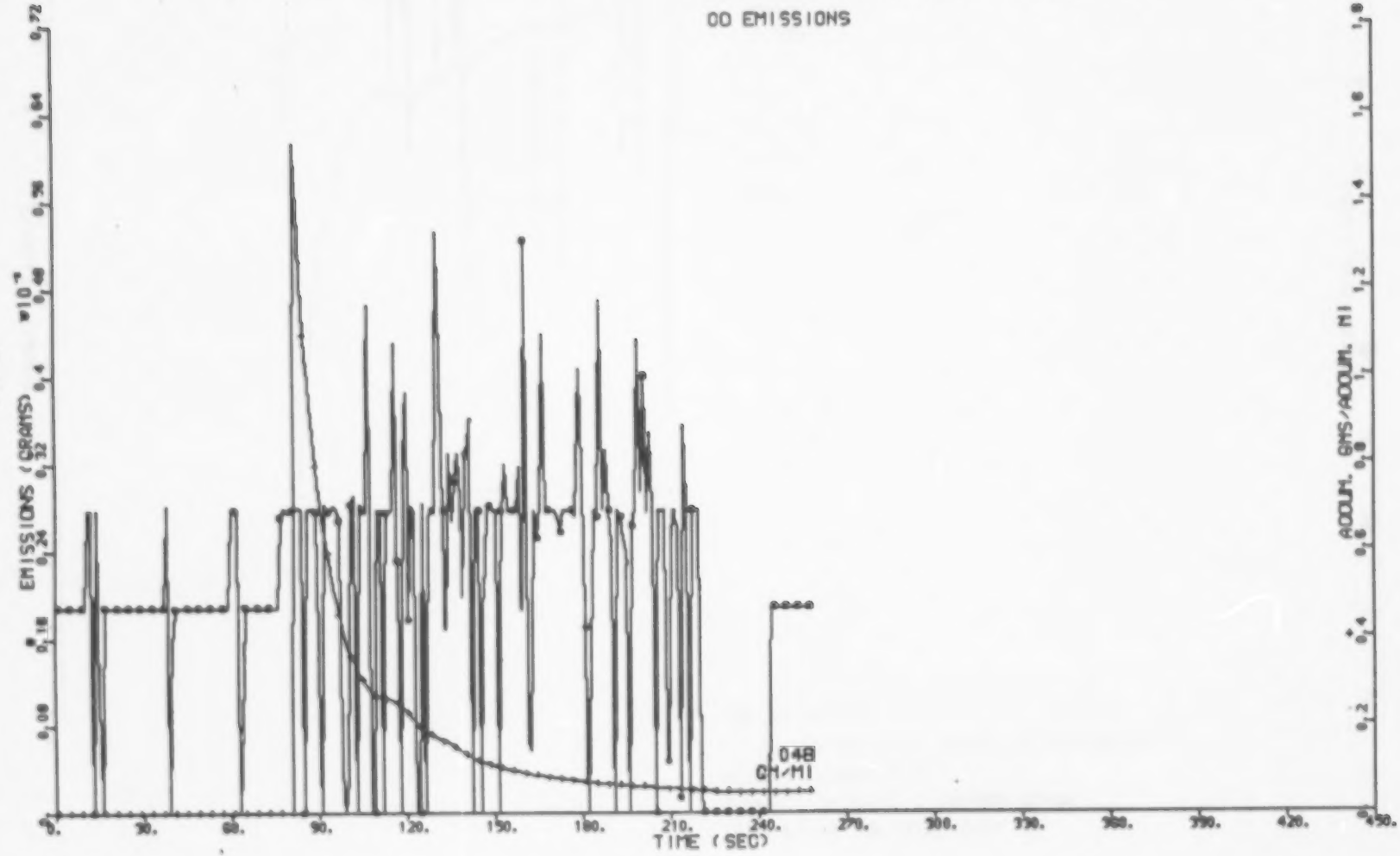
1977 BUICK 231 CID V-6 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LD 15 MPH DRIVING CYCLE 4.9 MINUTES
FUEL RATE



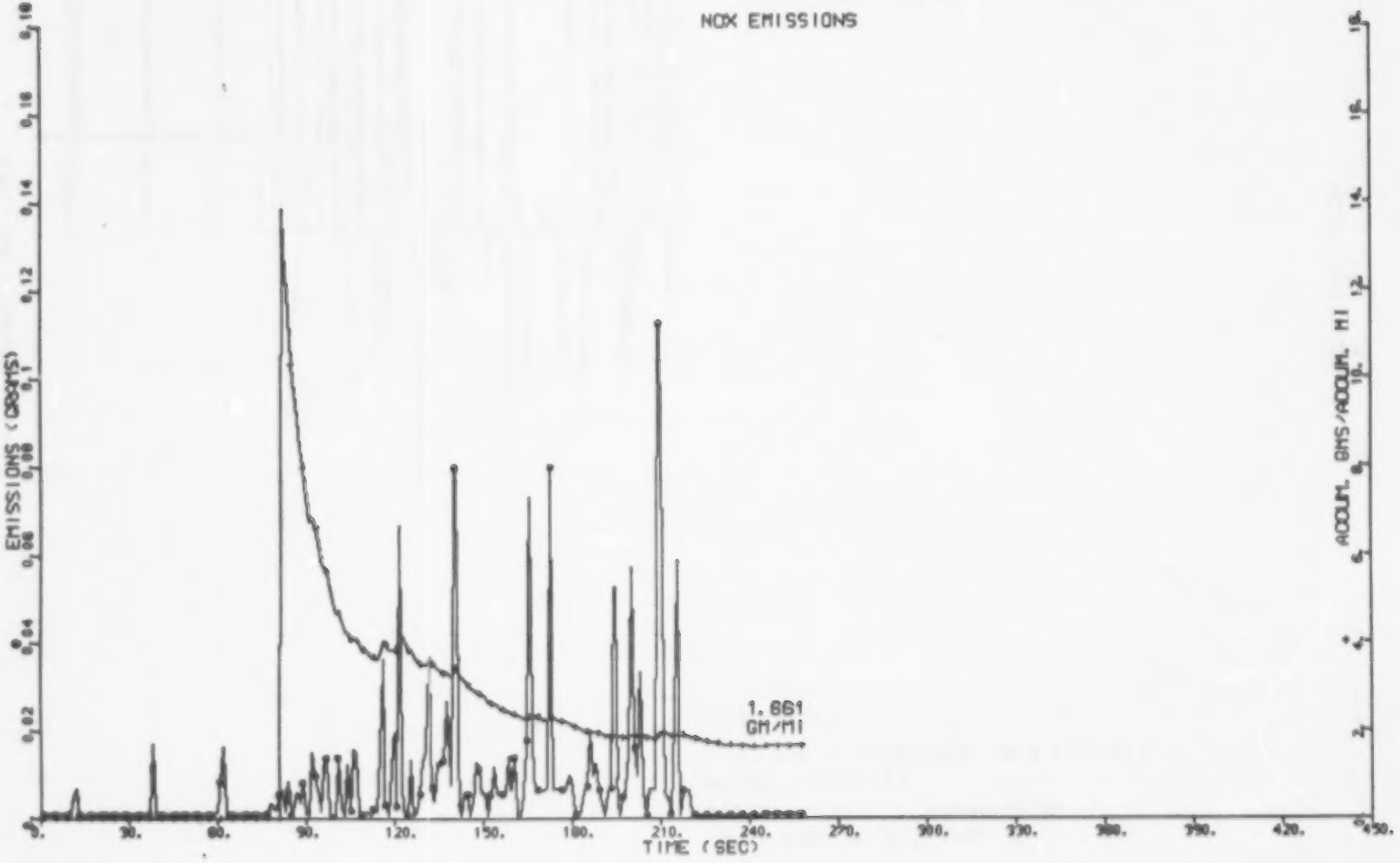
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LD 15 MPH DRIVING CYCLE 4.3 MINUTES
NO EMISSIONS



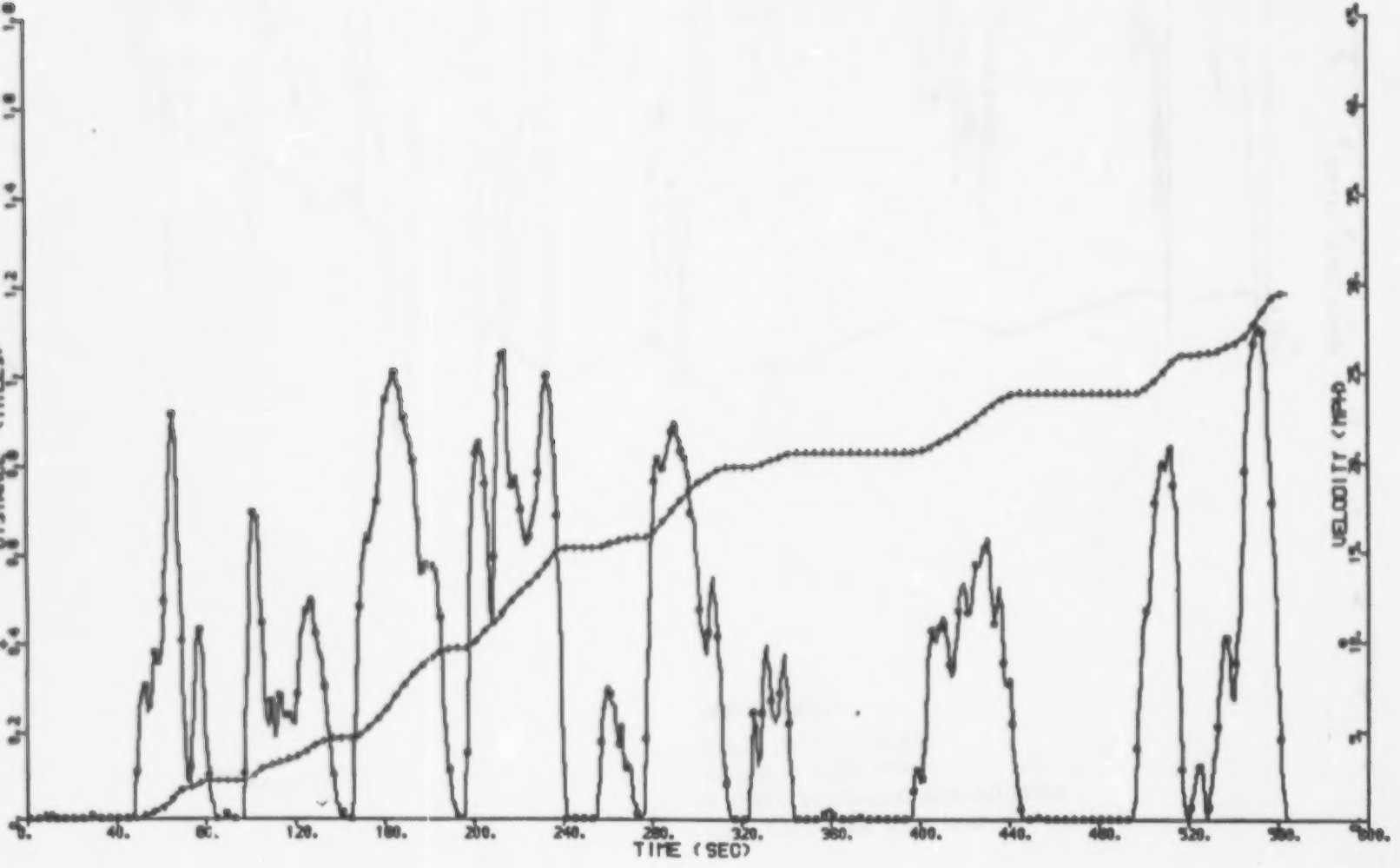
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LD 15 MPH DRIVING CYCLE 4.3 MINUTES
CO EMISSIONS



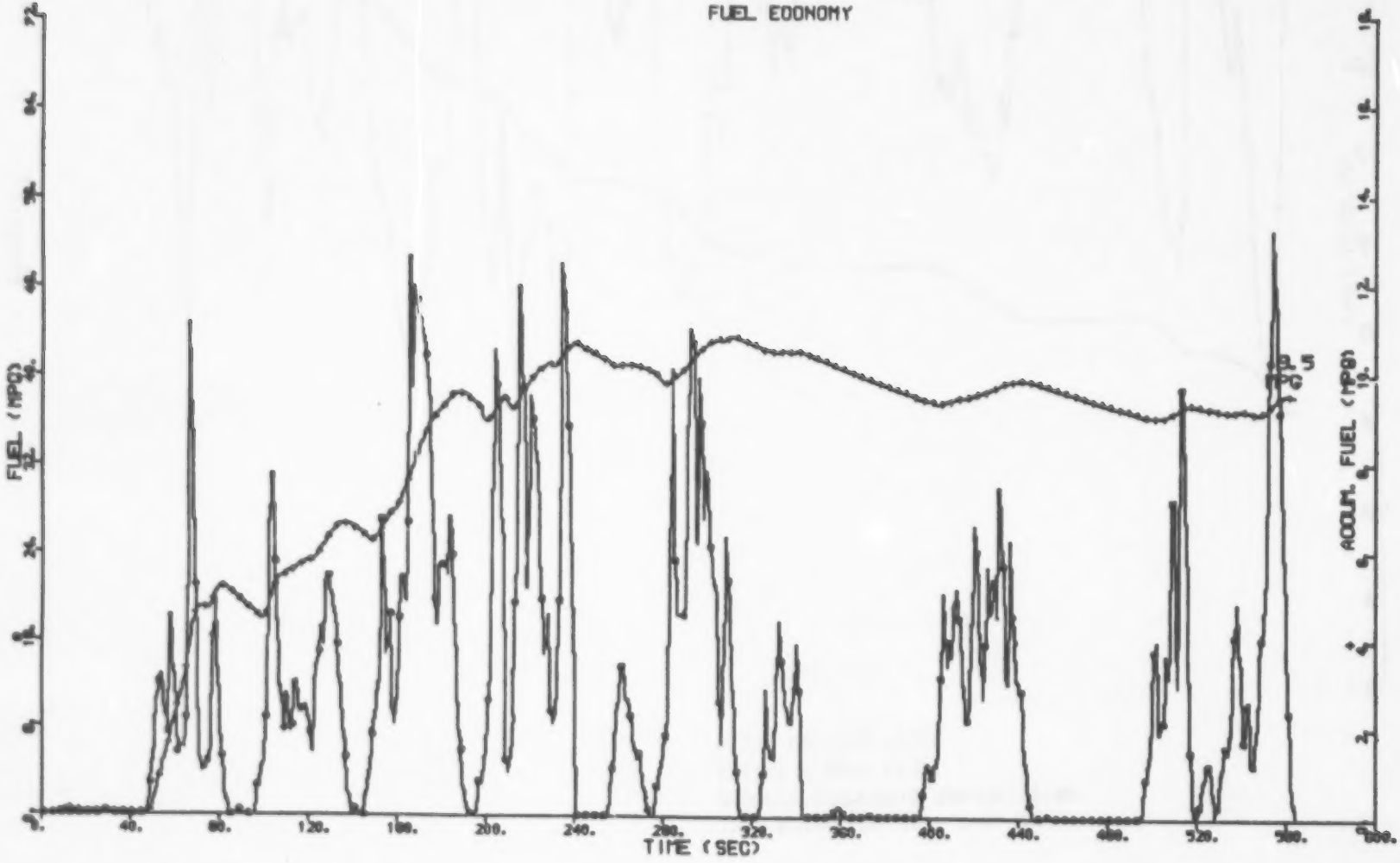
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
LD 15 MPH DRIVING CYCLE 4.3 MINUTES
NOX EMISSIONS



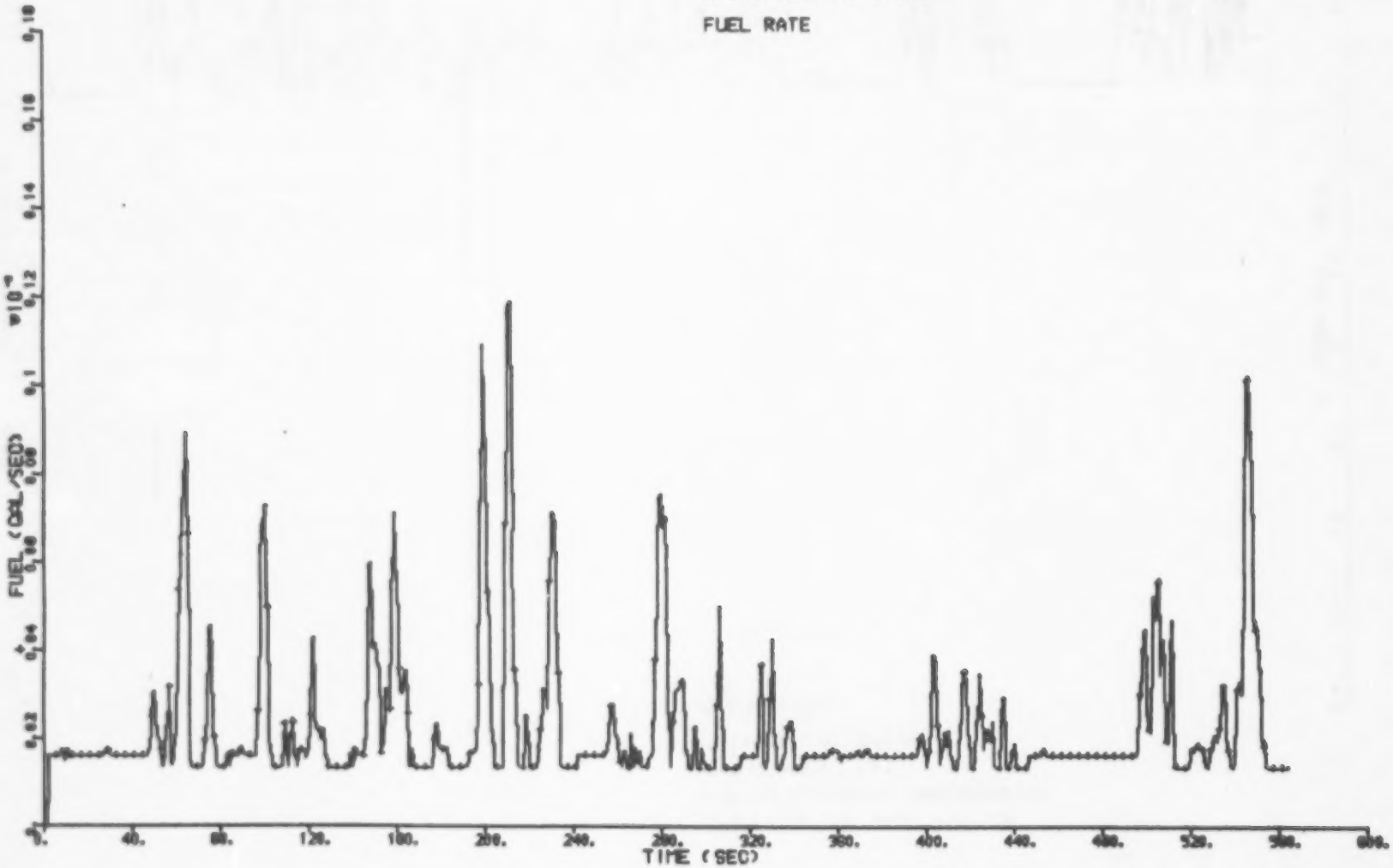
1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
NYC-1 DRIVING CYCLE



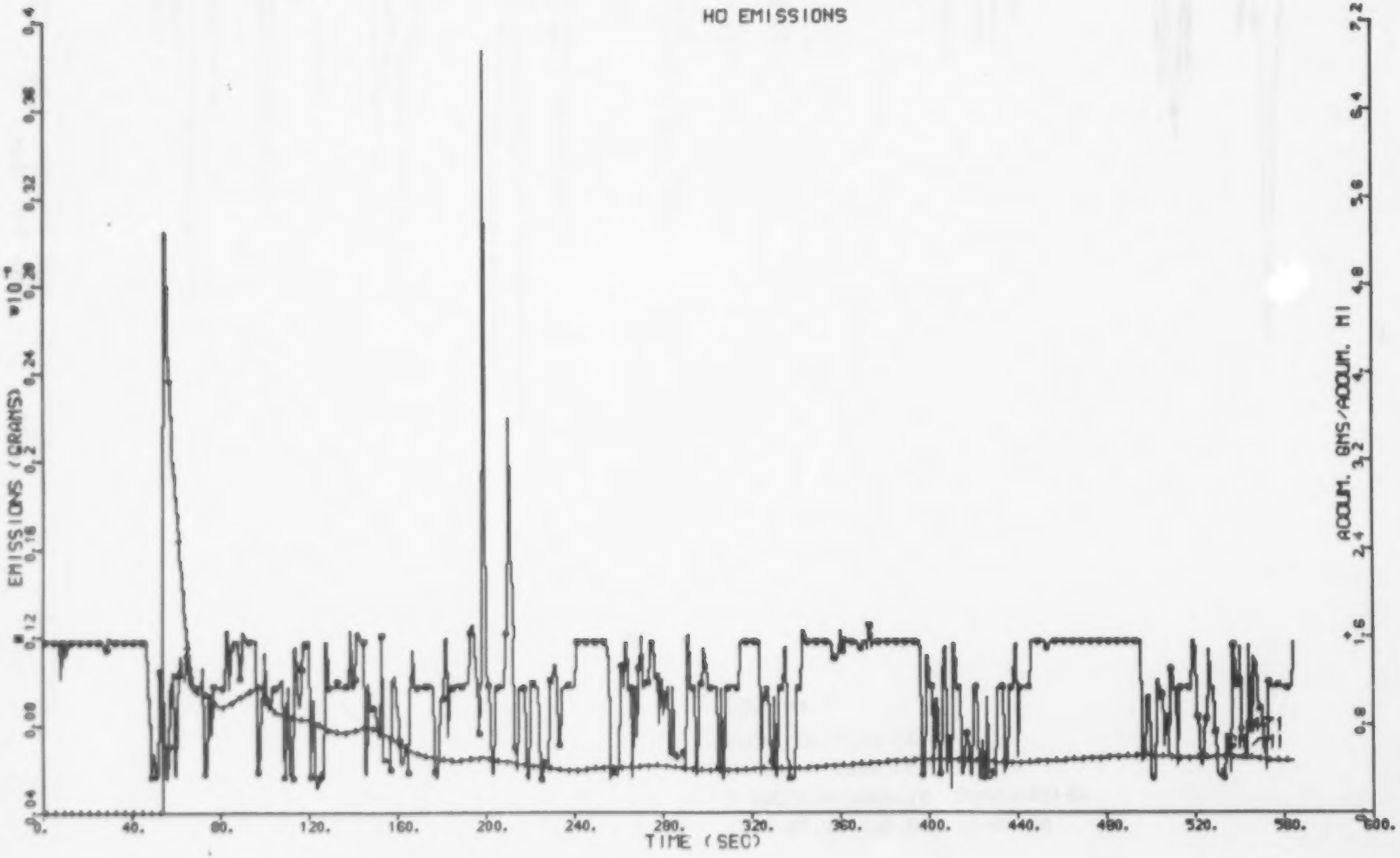
1977 BUICK 231 OID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
NYC-1 DRIVING CYCLE
FUEL ECONOMY



1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
NYC-1 DRIVING CYCLE
FUEL RATE

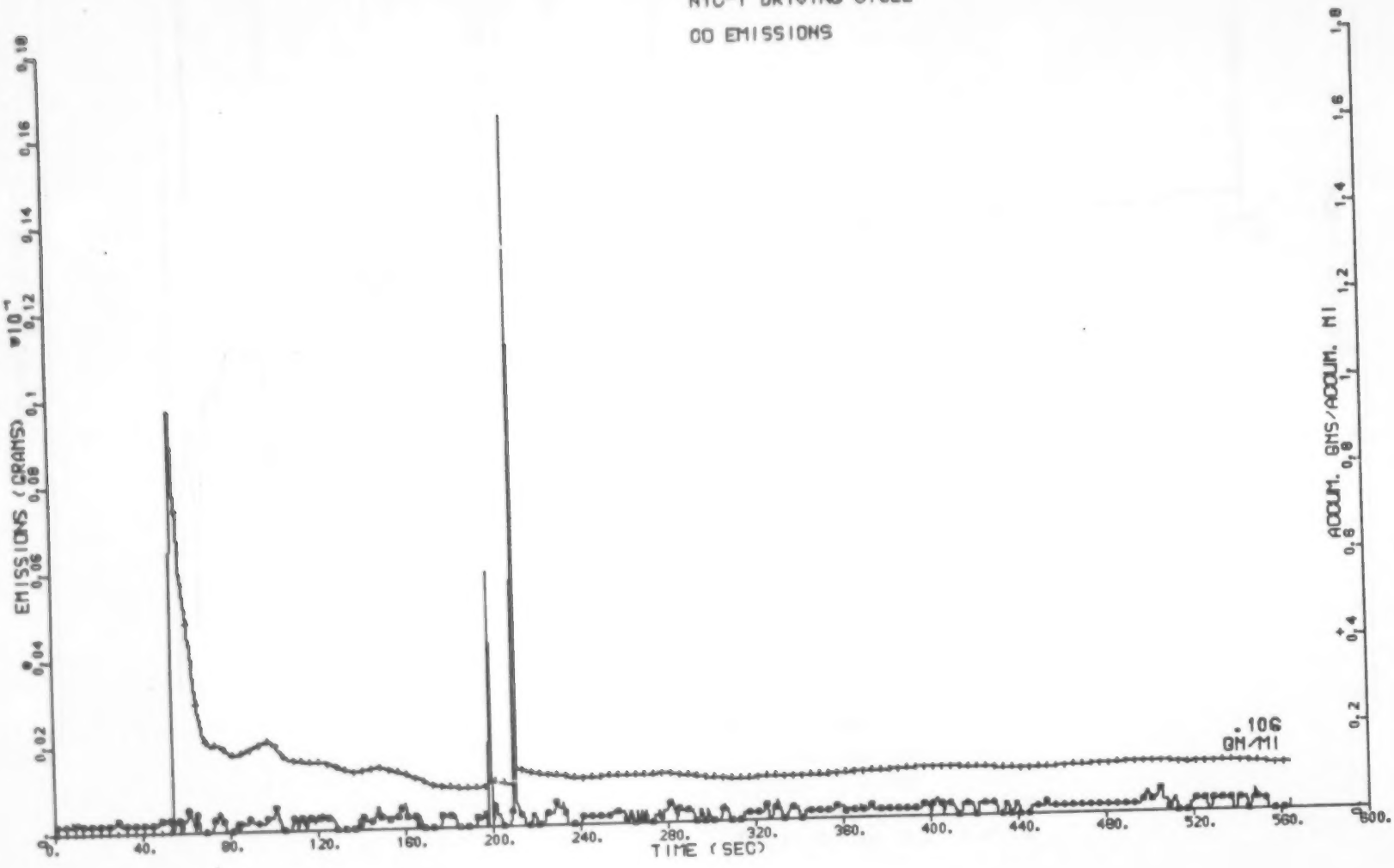
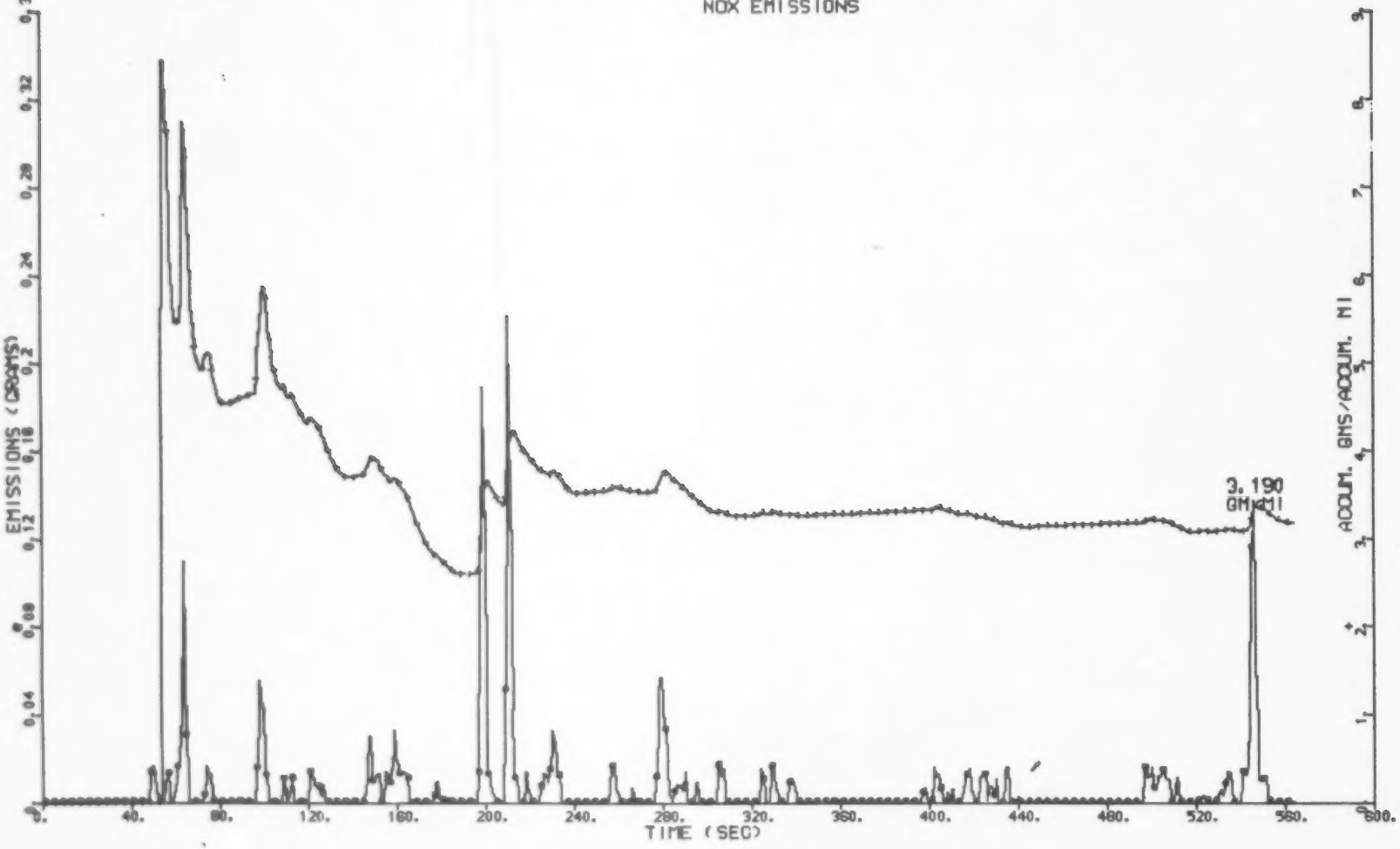


1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
NYC-1 DRIVING CYCLE
HC EMISSIONS



1977 BUICK 231 CID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
NYC-1 DRIVING CYCLE

CO EMISSIONS



1977 BUICK 231 OID. V-6. 2V
3 SPEED AUTOMATIC TRANSMISSION
WEIGHT = 3500 LBS.
NYC-1 DRIVING CYCLE
NOX EMISSIONS